VOL. XXXIII. NEW YORK—THURSDAY, NOVEMBER 25, 1915—CHICAGO NO. 22

The AUTOMOBILE

Tire Makers Enlarge Plants and Develop Product

60,000 Tires a Day—Straight-Side Pneumatic Heavy Gainer—Pressed-On Solids Displace Demountables—Factories Lead in Employees' Welfare Work

OVER 15,000,000 pneumatic tires will be needed to care for the motor car business in America in 1916. There are to-day in excess of 2,200,000 motor cars registered in the country. Add to this perhaps 700,000 cars that will be built by July 1, 1916. When you have added these cars to those already registered your total is 2,900,000 cars. Give five tires to each car and you get a tire total of 14,500,000 tires needed. Some cars will require more than five tires, but five is a conservative average.

To produce this number of tires there are to-day forty tire factories that are manufacturing pneumatic tires. Some of these produce more than 10,000 tires per day, others build 7500, others 1000, others 300, some 100, some 60, and a few but 40 tires per day. While Akron is looked upon as the tire mecca of America, a title it properly deserves, yet other tire centers are springing up, the State of New Jersey, occupying a mid-position between such population centers as New York and Philadelphia, being a particularly active tire center. Pennsylvania and New England have large interests.

To manufacture 14,500,000 tires in a year means to do this in 300 working days. Divide 14,500,000 by 300 and you get over 48,000; in other words our tire factories for home consumption will have to produce approximately 50,000 tires a day to meet the demand. This will not take care of our export trade which is developing, so that it will not be surprising if production may reach 60,000 a day in certain parts of the next few months.

Unparalleled Activity in the Field

Not for years, if ever in its history, has there been so much activity in the tire field. Expansion is in the air. New buildings have been going up all season and to-day the rush of construction is greater than ever. In Akron the big companies are adding enormously to their plants, some of them increasing their output 50 per cent; in other parts of the country some factories are doubling their capacity. The increased output of cars during the past year has necessitated these additions as well as the prospects for increased car outputs for 1916. This numerical growth is alone responsible for much tire factory development, but in addition comes the increase in export business.

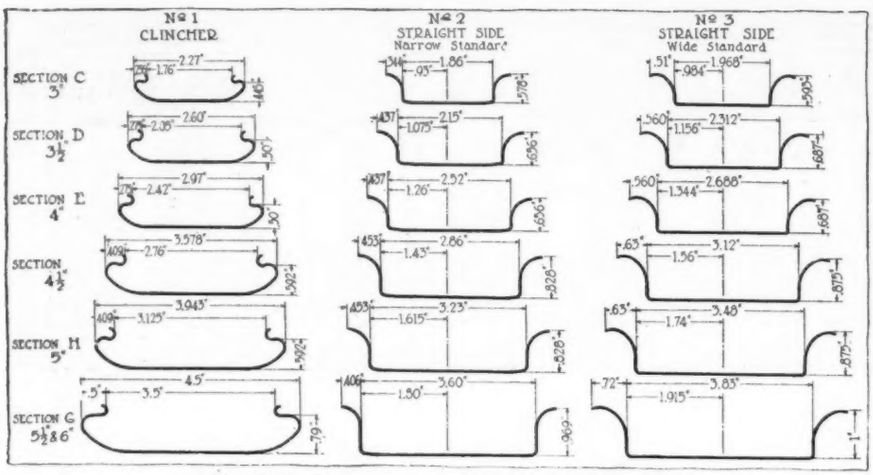
Extend Factory Facilities

To care for these increased tire demands factory additions have been the program of the year, the normal increase in the number of cars in use from year to year creating corresponding increase in tire factories. The Akron makers are among the leaders in this building wave, but other sections of the country are equally active. Firestone is at present working on nine new wings or factory additions which when completed will add 11 acres of floorspace, giving a total of thirty-two acres of floorspace. These wings are nearly all of the same size, measuring 120 by 80 ft., five stories high. In addition the company is erecting a large club house for its employees. The company hopes to double its output of solid tires and increase its output of pneumatics by 80 per cent.

Goodrich and Goodyear, the two largest producers in Akron, are adding to floor area, Goodrich erecting several large buildings, part of which will be used in its cord tire work and part in its line of rubber goods other than tires.

Kelly-Springfield has increased its floorspace 25 per cent during the year and its manufacturing facilities 200 per cent during the past eighteen months. Swinehart has added facilities in the last year to double its tire output.

Outside of Akron the program of additions continues. Fisk is making additions that when completed will give it about 20 acres of floorspace for making pneumatic tires. It has just completed a five-story reinforced concrete warehouse and the foundations are under way for a new factory building. The Pennsylvania company last year added a new building 140 by 200, six stories high. Ajax has just added a new curing room 50 by 100, one story, and is erecting a new factory building 250 by 300 ft., three stories high. The



Standard clincher and straight side rim sections

Falls Rubber Co. has a new plant 80 by 800 ft. with three stories and basement. The New Jersey Car Spring & Rubber Co. has doubled its floor area devoted to tire manufacture during the year.

Several new concerns have entered the field during the year, one being the Midgley Tire & Rubber Co., which started last spring in Lancaster, Ohio.

Too Many Sizes

The curse of the pneumatic tire business has been too many tire sizes, too many models. The Society of Automobile Engineers has been working for several years to reduce the number of tire sizes, and last January recommended the following as the standard sizes for pneumatics, having in all but nine different sizes, with the nine corresponding oversizes, making eighteen in all. Unfortunately this does not mean that the tire maker has only to produce eighteen different tire models; far from it. He has to make these in straight-side types, in quick-detachable clincher types, and some of the smaller sizes in the soft-bead clincher type for cars that use the clincher rim instead of the quick-detachable rim. But you can go further—the tire maker has to produce these in plain treads and also in non-skid treads, so that if these nine sizes were produced in all of these different lines the tire maker would have over seventy different tire models. Add to this the cord tires that are being produced, and if you filled the entire field with the cord models you would have close to 150 different models of tires, truly a big load for the tire manufacturer to produce.

The nine recommended S. A. E. tire sizes with their corresponding oversizes and also the necessary rim sizes for each are:

Rim Sizes Inches	Even Tire Sizes (for Manufacturers and Consumers) Inches	Odd or Oversize Tires (for Consumers Only) Inches	Tire Seat Diameter Inches
30x3	30x3	31x3½	24
30x3½	30x3½	31x4	23
32x3½	32x3½	33x4	25
32x4	32x4	33x4½	24
34x4	34x4	35x4½	26
34x4½	34x4½	35x5	25
36x4½	36x4½	37x5	27
36x5	36x5	37x5½	26
38x5½	38x5½	39x6	27

The object in recommending oversize tires only for consumers is that if an automobile manufacturer fits an oversize tire on his car when sold, the purchaser of that car has no opportunity of fitting any other tire size; whereas, if automobile makers will only fit the standard tire sizes it always leaves the owner with the option of fitting the oversize if so desired.

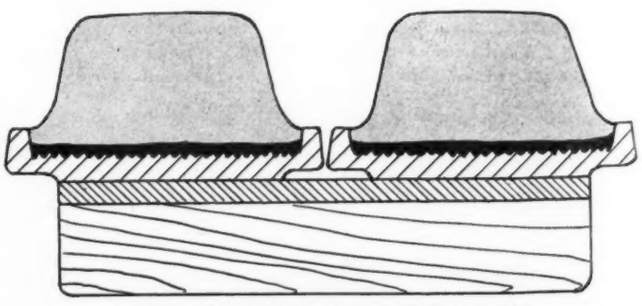
The American tire industry is fortunately free from the annual-model millstone that is clinging to the automobile business. Each autumn does not bring out any new announcement of the 1916 line of tire models. If the tire maker has a new anti-skid tread to announce he announces it in July or October, according as he is prepared to meet the demand. If he has a new hard rubber base solid for trucks he makes his announcement of it when ready, and there is no labeling it an annual model or anything of the kind. It just goes down on the price list as one more type or size.

There are few changes made in pneumatic tires from year to year. The tire contour has been well worked out. There is very little by way of adding a new layer of fabric. The thickness of tread, the formation of the bead or base and the general problems have been well worked out for several years, consequently it is not disappointing to get the reply, "There is little if anything new in our tires," as an answer to the question, "What is there new in your tires for 1916? What new models have you brought out? What are the improvements?"

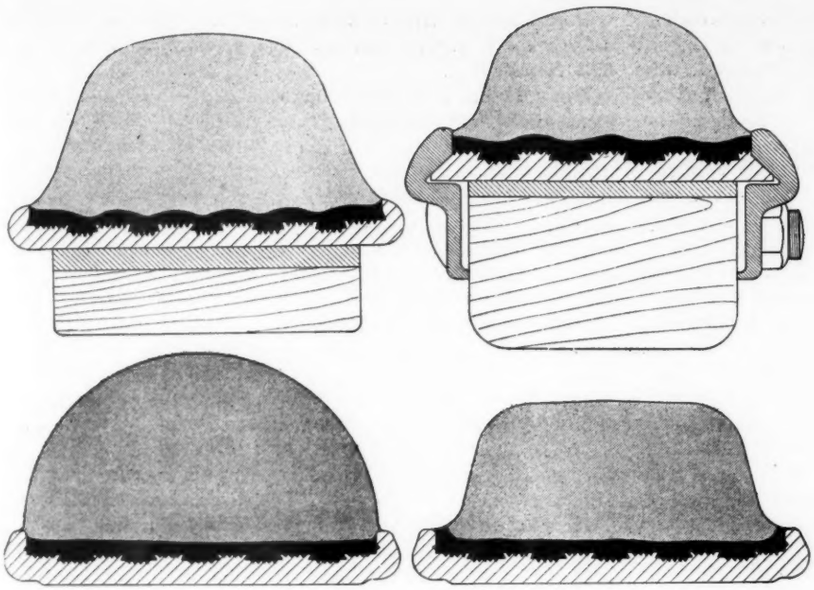
Do not infer that the tire makers are idle; far from it. They all have their corps of tire engineers. Instead of an engineering department at the tire factory it is generally designated the "experimental department." Here the large tire makers have a corps of graduated engineers and the walls and tables are covered with blueprints, just as in a car factory. Draftsmen are busy the year round. Consultations are going on every day and conferences on design and manufacture are a part of the regular program. Go to the garage of the factory and there you may see twenty or more test cars fitted with all kinds of experimental tires, each car being watched very carefully and the performance of all experimental tires watched with the utmost care. All these experimental tires look alike, excepting where a different tread is used. To the novice they are the same, but to the tire engineer, to the head of the experimental department, they are as interesting and different as the new car in the engineering department.

No. 1 car is fitted with tires in which a heavier fabric is used. No. 2 car uses rubber of a new compound; No. 3 has been vulcanized a little differently; No. 4 has the tread slightly different. So the differences go, each tire playing its role in the great enterprise of tire evolution which has been going forward restlessly since the opening days of the present century, identical as the engineers of the car are changing the axle design, adding lighter pistons, using new bearings for the crankshaft, improving the grade of steels in the gears, installing improved bearings in the back axle, using a stamping where a forging had previously been used, etc.

Restless evolution, never ceasing, but concentrating into fabric and rubber the brains of thousands each year, all to make the car go farther on a set of tires, make it consume fewer gallons of gasoline per hundreds of miles, and make it



Goodyear hard-rubber base pressed-on tire



Goodrich pressed-on and demountable types. De Luxe deep-section Goodrich on left

Giant Firestone solid to replace twin tires of 6 and 7-in. sections

Alternative sections of Hood hard-rubber base tires, European section at left and American section at right

a better medium to absorb the vibration of the car. No, tire engineers are not idle. Their work is not spectacular, and while the name of an automobile engineer is heralded from ocean to ocean when he brings out a new design of motor, we rarely if ever see in print the name of the tire engineer, yet he is doing his work to improve quality and cut down production costs.

Tire making bears a resemblance to the steel industry: the progress in the fabrication of steel parts in the car has been responsible for many car improvements. By producing better alloy steels we have been able to lighten parts and yet have them much stronger. Add some ingredient to a steel and you make it tougher. Add another ingredient and you give it the ability to withstand fatigue under constant strain.

Go to the tire engineer and he is working in chemistry just the same as the steel man. Take a trip through the calendering room of a tire factory where the crude rubber and the score-and-one chemicals entering into a tire are thrown into metal boxes a couple of feet square, and there you see the starting of the tire.

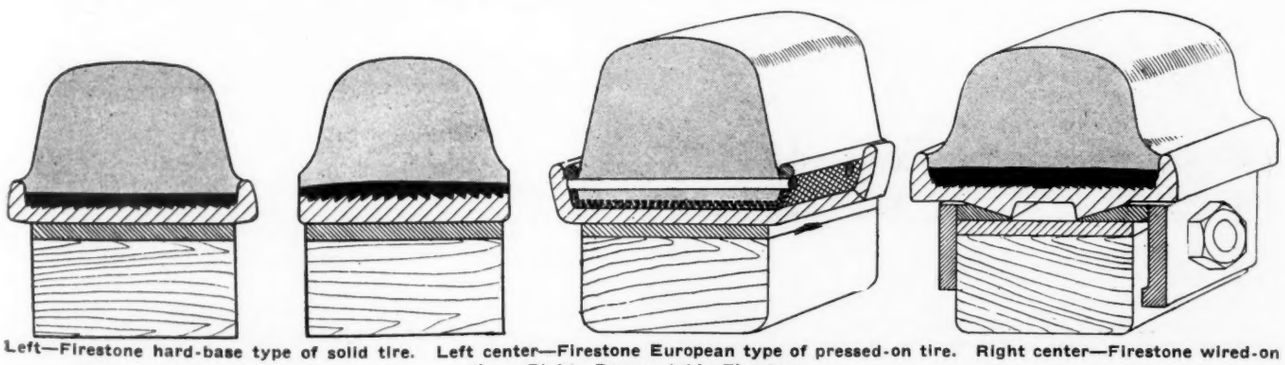
It's an indecipherable mass. You recognize the lumps of black crude rubber. If you have the cultivated rubber eye you can tell whether the rubber is the Para gum from the forests of the Amazon or the better washed product from the plantations of the East Indies and the Straits Settlements, or perhaps from the Congo in Africa. All three may be in the one box, and mixed with them are the chemicals, some yellow powders, some black, others green and others of nearly every color in the rainbow. You see all, you walk between rows of these piled on the floor like baskets of groceries waiting for the delivery boy in a grocery store. You see them, but that is all.

Compounds Are All Secret

Ask what this chemical is, ask about that, and the same reply comes, "That is our secret. Our compounds are all secret. We have hundreds of compounds, but no outsider ever gets a glimpse at the compound book."

That is the treasure of the factory. The compound used in this or that tire is just as great a secret as the ingredients and their proportions in some patented liquid. For this compound perhaps five or six high-grade chemists in the experimental department work year in and year out. The improvements in these compounds make the tires good or bad, make them capable of withstanding heat, make them tough, make them flexible, or make them meet any of the demands that the tire maker has to cope with. Each metal box is carefully measured out by weight, just as carefully as your druggist fills the prescription that your doctor gives you. As great accuracy is necessary. Each box bears its ambiguous label, but not even the workmen have any conception as to the proportions of its contents or the value of each in the whole. It is tire mystery, yet tire science, and represents much tire progress.

But these boxes of crude materials are not the only secrets in the tire factory. These masses of crude after having been chewed and re-chewed, ground and re-ground, lacerated and re-lacerated, extenuated and re-extenuated between the giant steel rolls of the calendering machines that are needed just to thoroughly mix the ingredient. Each compound requires its separate mixing, its special treatment.



Left—Firestone hard-base type of solid tire. Left center—Firestone European type of pressed-on tire. Right center—Firestone wired-on tire. Right—Demountable Firestone

These different compounds require more special treatment. Then the tire is put into the vulcanizing wells to be cured. Each compound demands its special treatment. For one compound the temperature in the vulcanizing well is higher than for another. For one an hour may be long enough, for another too long, and for a third too short; so that the innocent trays of the crude materials for the rubber call for special treatment right through the factory. These different compounds are often just as different as grades of iron and require different treatments. They are like different alloy steels: when tempering a chrome alloy it is necessary to bring it to a certain temperature; treating nickel steel calls for a different temperature, treating tungsten still a different, and so with the other kinds of alloy steel.

Compounds are then the great secret in tire progress, and if we were to tell the story of the annual tire model it would be necessary to lay bare the pages of the compound book, and perhaps after doing so few would be much wiser, and if we wanted to break into the inner secrets of the tire concerns to this extent there is not a single factory that would give you the privilege.

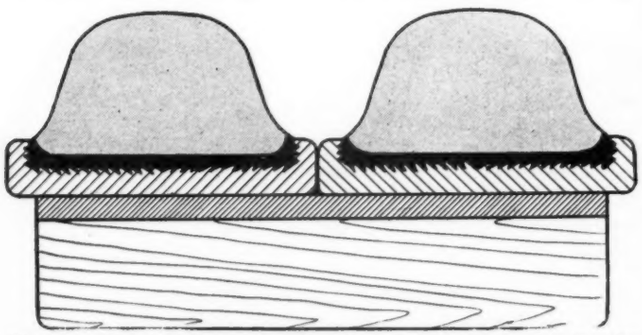
Manufacturing Methods

But tires are not all rubber; there is fabric and there is also the method of bringing the fabric and rubber together—that is, the methods of manufacture. There is sometimes as much mystery about the fabric entering into a tire as there is the compounding of the rubber. Several of the tire factories will not admit you to the rooms where the fabric is inspected and put through its preparation processes. These factories will talk about fabric made from Sea Island products and Egyptian products, and will give you its weight per square unit, but they go further and inspect every strand of it. We all know how to hold our fingers close together between a bright light and our eyes to see the vague skeleton lines. The tire factories require that all fabric pass over rows of electric lights so that inspectors can see every thread, and if there is a broken thread the piece is supposed to be rejected, as a broken thread may mean a premature blow-out.

Lastly the tire maker watches the manufacture of the tire and uses utmost care to see that the layers of fabric, placed one over the other in building up the tire carcass, as they invariably term it in the tire factory, are stretched properly over the mold and at the same tension. To do this the tire-making machine has been developed, and to-day all of our large factories producing tires in quantities of 1000 per day or more use the tire making machine, which is the last word in applying an even tension to the layers of fabric so that the fabric is not under uneven strains and so that there is desired uniformity in all tires.

Machines No Longer Mysteries

These tire making machines for years were shrouded in mystery. Some times they were in locked rooms, with the "No admittance" sign on the door, but of late this mystery has vanished and now you are taken through the tire factory with its special tire making machinery with no more concern than if walking through the machine shop in a large motor car factory.



Gibney hard-rubber base pressed-on tire, showing twin mounting for heavy trucks

Many of the tire making machines are sold on a royalty basis, the tire maker having to pay a certain royalty on each tire built by the machine, the same as is done in the shoe-making field. Not over a dozen of the big tire concerns use these machines, which are of quite different designs, it being almost impossible to recognize scarcely any similarity between a machine of one make and that of another. There is nothing mystifying about them. Building the carcass of a tire is akin to wrapping a bandage around your finger. You start wrapping the bandage one layer over the other and endeavoring to keep the tension about the same, not wrapping one layer very tight and the other loose, but keeping the tension of all the same. Well, in a tire making machine this wrapping is done by the machine. One size of tire may have six layers of the fabric which is impregnated with rubber, another may have seven layers and another may have eight, depending on the size of the tire and the maker.

In wrapping the tire fabric like the bandage on your finger the main difference is that the fabric is wrapped on a metal ring, they call it a core, which is the exact size of the inside of the casing, just the size of the inner tube when in the casing. In wrapping this fabric there are small revolving disks that press the fabric evenly onto the core, making it into the exact form of the casing. After a few layers are on the bead is put on, just a kind of hoop which is placed on each side, and then some more layers are put on and cover the bead.

The great advantage of the tire making machine is that the fabric is always stretched at the same tension, this being done by weights or other combinations. On a tire making machine some of the smaller sizes have the carcass built up at the rate of three every five minutes. The tire is not by any means complete when it comes off the machine, but has to have the tread applied and much trimming and other work done.

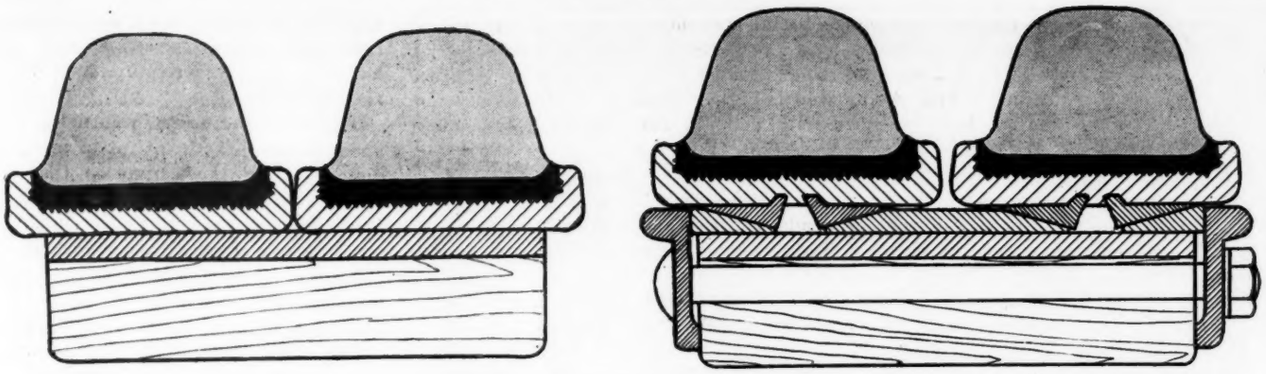
Straight Side Comes to the Front

In the tire world the questions of straight-side, quick-detachable clincher and regular or soft-bead clincher tires are of more or less concern. The straight-side tire is the one without the clincher beads to hold it in the rim. It uses a different style of rim. The quick-detachable clincher is one used on quick-detachable or Q-D rims, which have a removable ring at one side. These tires have the non-extensible bead, that is the bead that cannot be stretched. You could not possibly put this tire on over a clincher rim without the removable side ring. Lastly there is the soft-bead clincher such as used on the Ford car, and other cheap models in which the bead can be stretched so that the tire can be applied over the regular clincher rim.

At present the straight-side tire is making strong gains over the two clincher types excepting in the very low-priced field. One of the largest makers is producing eight times as many straight-side tires as Q-D clinchers, and with many other companies the increase in the use of straight-side types has been very rapid during the last few years. Nearly every tire maker reports large gains in the demand for straight-side types.

There are the usual arguments as to the relative merits of the straight-side and clincher types of tires, but these arguments are not so intense as they were a few years ago, a condition largely due to the gains in the straight-side designs and the fact that practically all manufacturers are building both types according to the respective demands.

So far as price is concerned there is not any difference between one and the other, and when the question of manufacture is considered there is little difference, as the added cost of manufacture in one as compared with the other would



Left—Hard rubber base, and Right—Demountable types of Kelly-Springfield dual solid tires

only be a matter of a few cents which would not matter.

With the car user the straight-side type is attractive, as it is generally conceded to be easier to get on and off the rim. In a canvass of over twenty different tire makers on the relative merits of the straight-side and the clincher types it was generally conceded that there is a somewhat greater air volume in the straight-side type, this increased volume ranging from 5 to 12 per cent or perhaps 15 per cent, depending on the design of casing. Some makers of clincher tires deny that the straight-side type has greater air volume because of the design of their clincher type. Some of the largest tire manufacturers are honestly frank when they say they manufacture both kinds in response to the demand and that they would glady welcome the time when either straight-side or clincher types would be standardized so that it would only be necessary to carry one type in stock, whereas to-day if they have thirty different tire sizes they carry these in both clincher and straight-side types thus doubling the value of stock carried as well as doubling the work of carrying it. Many tire makers are quite settled in their own minds that the straight-side design will be the eventual one and even see the time when the manufacture of the clincher type will be discontinued by a majority.

Cord Tires on Increase

One of the pronounced tire trends of the past year has been the greater volume of cord tires used, cord typifying a form of construction opposed to fabric tires. Goodrich and Goodyear are the great exponents of cord construction to-day, these being the leaders in marketing the cord product, although there are many other concerns that are experimenting with and developing the cord design in one form or another.

Goodrich has been manufacturing the Silvertown cord in quantities, having installed banks of machines by which the tire carcass is built up of two layers of continuous cords laid side by side as closely as thread on a spool, but the arrangement being different. Goodrich has the patents for America for this tire, which is the invention of an American, John Palmer, who now resides in Riverside, a suburb of Chicago, and who is still active in the field of tire invention.

Goodyear has a quite different form of cord tire in which the cords in one layer lie parallel and are so held by fine cross strands, ½ in. apart. These strands permit of the cords being handled the same as a piece of cloth, which in turn enables the company to manufacture its tire practically the same as a fabric tire; whereas the Silvertown cord tire is made by winding a single cord from side to side until you have built up two complete layers, which form the tire carcass. In Goodyear the layers of cord are applied like layers of fabric would be.

Advantages of Cord Tires

The advantages advanced for cord tire constructions are reduction of vibration, improved coasting, increased speed and reduced gasoline consumption. The theory of explanation is that the cord tire casing is easier to bend or dent when passing over a small obstacle than the fabric, due to the fabric being composed of woven strands lying at right angles to each other, the same as in any woven texture. It requires more pressure to dent such a fabric and consequently more power is required to drive a car over an obstacle. Conversely, when the question of coasting is considered the car coasts further because its coasting is less retarded by passing over obstacles. There are objections, of course, to the use of different forms of cord tires, the objections depending on the form of construction. With some forms of cord tires it is harder to make a repair than with a fabric, it being understood that a cut is a factory repair job, whereas a similar cut in a fabric tire could be repaired as well at a vulcanizing shop as at the factory. The cords used are generally larger than heavy wrapping cord and naturally cutting one is more serious than rupturing a few strands in a woven fabric. Cord tires are considerably higher in price than fabric types, some makes being 40 per cent increase.

The prices on practically all makes of fabric tires are from 14 to 20 per cent lower than they were a year ago, a general reduction having taken place last February. Few decreases have taken place since then. Compared with four years ago the price of tires is 40 per cent lower to-day. The price of crude rubber has been relatively steady during the past year, except soon after the outbreak of the war when the price soared temporarily due to uncertainty regarding shipments of crude from the East Indies and the Straits Settlements, both large producers of crude; in fact, 60 per cent of American crude comes from these sections. There has not been any shortage, and to-day our rubber makers have plenty on hand. Recently England placed an export duty of 2.5 cents per pound on all crude leaving her ports, but that has not resulted in any increase.

Since last spring when Great Britain placed the embargo on crude all of the supply entering America has come consigned to the British Consul General, this being in accordance with a gentlemen's agreement entered into by the American tire makers and the British government. Through the Rubber Club of America, New York, the desired distribution to the different tire companies is effected. The tire companies have agreed to make complete statements regarding articles which are exported, the object of Great Britain being to prevent these articles reaching her belligerent enemies.

To carry this agreement still further the tire makers have agreements with car and truck makers to whom they sell tires, to the effect that all shipments of tires out of the country must be reported and no tires, not even on vehicles are permitted to go to such neutral countries as Norway, Sweden, Denmark, Holland, Switzerland, etc., except by way of England. There have been very few abuses of this working agreement. For a time a few car makers made shipments that were not reported and it looked as if Britain might

Putting on solid tires with a powerful hydraulic press at a Goodrich service station

place restrictions on crude shipments to America, but this has not occurred, and to-day the sky is clear so far as the supply of crude is concerned.

60 to 70 Per Cent of Crude from Far East

At present approximately 60 per cent to 70 per cent of the crude used by the makers comes from the rubber plantations of the East. The remaining 40 per cent comes from the Amazon valley in South America. The crude from the East reaches the factories in a more uniform and workable condition. It is better washed and more quickly and easily handled in the tire factories. The large majority of the plantations in the East Indies are owned and controlled by England. All of it is brought in English boats and it is cleared through the rubber brokers of London. During the war shipments to America have been made easy and simplified since the embargo agreement referred to was made.

The manufacture of the metal rims for pneumatic tires has practically been regulated by the Clincher Automobile Tire Manufacturers' Association, Cleveland, Ohio. This association numbers in its membership nineteen of the largest tire makers, fourteen concerns manufacturing rims, demountable wheels, etc., some of the latter having associate membership only. This association has practically standardized all types of rims such as straight-side, Q-D clincher and regular clincher. These different sizes are illustrated herewith, page 956. Height and width of each only appear as some of the other dimensions have not been entirely agreed upon by the different members of the association. As the illustration shows there is one set of standards for Q-D and clinchers and two distinct standards for straight-side rims, one known as the narrow standard and the other the wide standard. No. 2 is the narrow and No. 3 the wide.

The Clincher Automobile Tire Manufacturers' Association has its inspectors at all factories manufacturing any of these types of rims, whose duties consist of inspecting all rims to see that they are accurately made and also to stamp them with the association's stamp showing that they have been inspected and measure up to the requirements of the association.

Tire manufacturers in turn have set about to manufacture tires to meet the dimensions of these rims so that one make of tire of a given dimension is interchangeable with any other make, in other words if the tires are carefully made one make should fit as well on a standard rim as another make. As the rims used on wire wheels are inspected by the rim association they offer no obstructions to the use of any tire.

Anti-Skid Tires Gain

The use of anti-skid tires is steadily on the increase and new types are being brought out each month or as makers see the demand increase. These are all of the rubber type but with the anti-skid patterns of all kinds. Several rubber makers report that over one-half of their output in the larger sizes are non-skids. One of the last concerns to adopt the rubber anti-skid was the Michelin, that entered the field a few months ago with its Universal tread made for straightside and quick detachable clincher rims. The Universal is a depressed type of non-skid in which it is aimed to combine the features of the suction non-skid as well as that of the raised or studded type, leaving a heavy, broad flat tread on which are two rows of diamond-shaped depressions in the tread with horizontal notches from the diamond to the side of the tire.

While not bringing out anything new in non-skids several tire companies have added slight improvements. Goodyear for several months has been increasing the size of the buttons on its A. W. tread.

Empire is changing the design of its non-skid making the non-skid portion wider and lower, and will bring out a red non-skid cord tire with the same non-skid design as used on its fabric tires. Miller continues its geared-to-the-road non-skid.

The Falls company has nothing new excepting a dead black tread, and expects to add a cord tire during the coming winter. The National company is bringing out a new tire, the Redwall, with a white tread and red side wall. Carspring is making a majority of its tires with non-skid treads and has improved these by slightly altering the bevel of the cups. Globe is now working on a new non-skid. The Mansfield company has a cord tire with its new design of Ohio non-skid.

The Combination Rubber Mfg. Co. will soon bring out its new Hold-On non-skid tire which is a depression type.

The Racine company is manufacturing a cord tire in addition to its horseshoe brand of fabric tires.

Braender has brought out a new model tread during the year known as its new type non-skid. It relies on the hold of arc-shaped cross bars of rubber on the tread as well as the vacuum created in the depressions between these bars.

Hood manufactures two brands of tires, the Hood and Puritan. Hood is in both plain and arrow non-skid treads and the Puritan in plain and gripper treads.

Republic is manufacturing its two non-skid types, the staggard and its newer W-M tread.

Swinehart manufactures a depression type of non-skid, the depression being a series of irregular octagons in the tread.

Hard-Base Solid Tires Gain Followers

AT present one of the most important trends in the solid tire business is that toward the use of the pressed-on tire in preference to the demountable tire. In our larger cities the pressed-on solid tire is gaining, whereas in the smaller outlying cities and towns the demountable tire has the following. The reason is: To remove a pressed-on tire from a truck wheel or put one on a wheel requires a hydraulic press that costs between $500 and $700. This is considerable outlay to the dealer for the amount of work he may get. To make it a little easier some of the tire companies are assisting the dealer by selling these presses at the rate of $100 down and $100 per year until paid for, on the condition that the dealer uses the press only in connection with the make of tire manufactured by that company, although this narrows the field for the dealer.

In small cities and towns the demountable solid tire is looked to to continue in use for some time. From its very nature it can be removed from the wheel and a new one fitted without the truck owner having to take it to a garage. Unfortunately it is more expensive than the pressed-on tire, due to the several forged and rolled steel parts used with it. Practically all of the solid tire makers are continuing their demountable types but the number produced is on the wane.

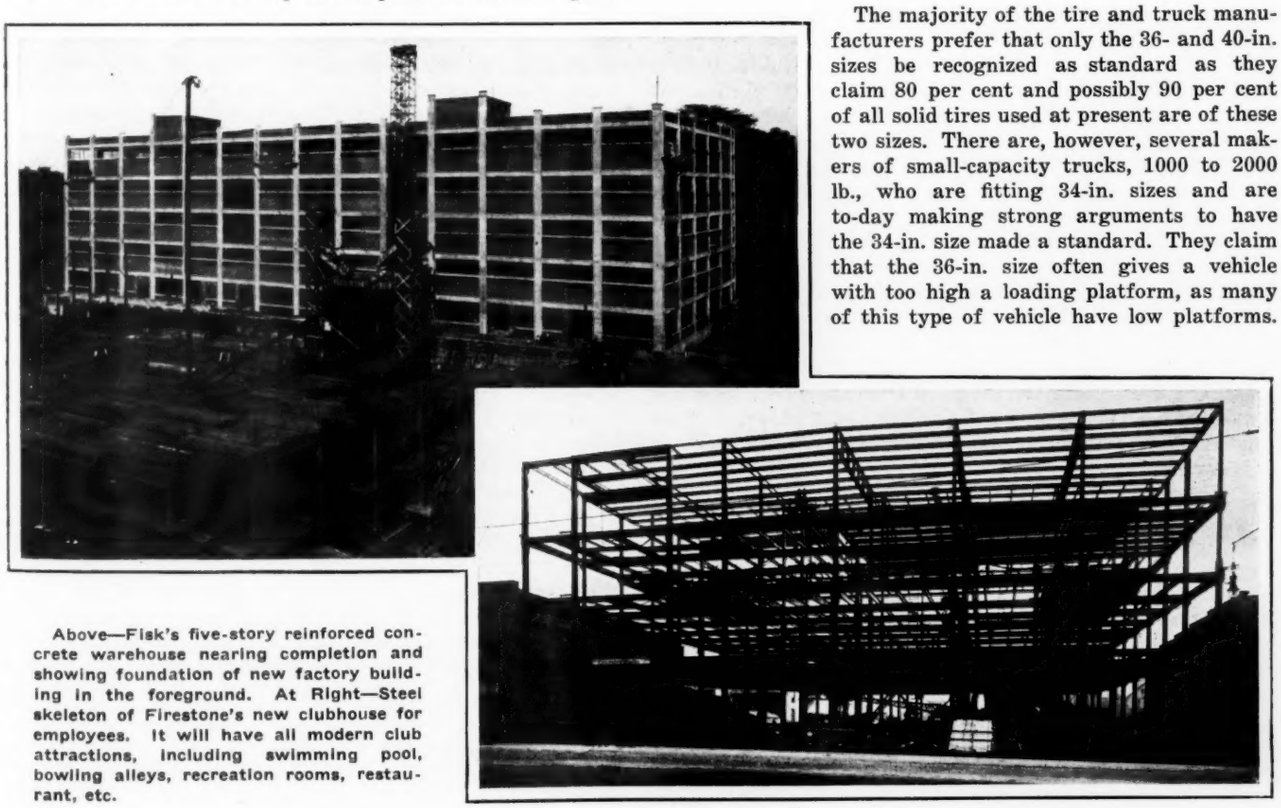
During the past year several movements have been exhibiting themselves in the solid tire field. What is known as the hard-rubber base tire has gained over other types during the year. This tire is built onto the rim in the tire factory and cannot be separated from it. The surface of the rim is cut with grooves, undercut notches or in other ways so that the hard rubber base gets a firm anchorage into the rim. In manufacture this rubber base is applied in some factories in layers just as you wrap a bandage on your finger. The base is relatively thin, perhaps not one-eighth the radial thickness of the tire. On top of this part is built the regular rubber part of the tire, of softer rubber to afford the desired resilience. This part in some factories, is built up just as you wind the bandage on your finger until the desired thickness is obtained, which when done the tire is trimmed to shape and then vulcanized. Thus you see the metal rim is a built in part of the tire. Some of the concerns building this type of tire are Goodrich, Firestone, Goodyear, United States, Republic, Kelly-Springfield, Gibney, Swinehart, Hood, etc.

There are other types of solid tires such as the side-wire built by Firestone specially for the smaller sizes. This tire is not manufactured into the rim as is the hard-rubber base type but is afterwards attached to the rim. Into the base of the tire are placed stout cross wires at frequent intervals. When the tire is placed on a channel rim it is held in place by two circumferential wires, one at each side of the tire, these wires resting upon the ends of the cross wires, by virtue of which the tire is retained on the rim. Swinehart manufactures what is called a soft-base tire with cross wires for holding it in the channel rim.

An important movement in solid tires to-day is that of endeavoring to reduce the number of sizes to fourteen if possible. For several years tire makers in connection with the Society of Automobile Engineers have been working on this problem and to-day it looks as if the following will be the eventual sizes for solid tires:

34	in	2.5 in. width
36	these	3 "
40	widths	3.5 "
		4 "
		5 "
		6 "
		7 "

The majority of the tire and truck manufacturers prefer that only the 36- and 40-in. sizes be recognized as standard as they claim 80 per cent and possibly 90 per cent of all solid tires used at present are of these two sizes. There are, however, several makers of small-capacity trucks, 1000 to 2000 lb., who are fitting 34-in. sizes and are to-day making strong arguments to have the 34-in. size made a standard. They claim that the 36-in. size often gives a vehicle with too high a loading platform, as many of this type of vehicle have low platforms.



Above—Fisk's five-story reinforced concrete warehouse nearing completion and showing foundation of new factory building in the foreground. At Right—Steel skeleton of Firestone's new clubhouse for employees. It will have all modern club attractions, including swimming pool, bowling alleys, recreation rooms, restaurant, etc.

These three sizes will be a big improvement as compared with a time ago when solids were made in 32, 34, 36, 38, 40 and 42-in. sizes making in all forty-two different sizes. To-day there are over 150 cities in the country with twenty-five or more motor trucks and the tire depots in these cities in attempting to give the best possible tire service have to carry many slow-moving sizes, which will have to be done for a few years yet, but which work will eventually be much simplified by settling on perhaps two or three different sizes.

Goodrich's New Policy

During the year Goodrich has been promulgating its new policy with regard to single and dual tires for heavier truck work. To-day Goodrich is recommending a 7-in. single in preference to 4-in. duals; 6-in. singles in preference to 3.5-in. duals; and 5-in. singles in preference to 3-in. duals. The arguments are that these singles give better results than the corresponding duals in that often on the road one of the duals has to take the entire weight of load on that wheel and that as it is not designed to take the entire load it is naturally overloaded and perhaps permanently injured by this frequent caring for the entire load weight on the wheel. With singles this is not the case.

Another Goodrich movement of the year is the introduction of the De Luxe type of solid tire in both single and duals. The De Luxe is a higher section tire, one designed after the higher-section tires used in Europe, although the Goodrich uses a quite different contour from the European makers. These Goodrich De Luxes are much thicker radially than their other solid. On a 5-in. size they are 0.75-in. thicker; and on 6- and 7-in. sizes are 1 in. thicker. Greater resilience is claimed as well as longer life and greater load carrying capacity. It has been designed for extra heavy duty and is recommended as an oversize with the same sectional width. The carrying capacity per tire is 500 lb. greater. Hood has introduced higher-section tires during the year.

Firestone has recently introduced what is known as the Giant single solid tire which is made either 8 or 12 in. wide. The extra amount of rubber in this tire is claimed to make it oversize equipment for 6-in. duals and equal equipment for 7-in. duals. The tread has three evenly-spaced circumferential grooves in it.

Tire Factories Leaders in Employees' Welfare

WELFARE work in the factory of the Firestone company, Akron, is being pushed particularly actively at the present time. The company is at present erecting a club adjacent to its factory which measures 125 by 151, four stories in height. The steel construction for this club house is practically completed and the club will be occupied Feb. 1. It is intended solely for the employees of the factory and office. It is expected in the carrying out of the club that each employee will take a membership which may be obtained for a nominal sum, perhaps $1 a year. When finished the club will be very complete. In the basement there will be a tiled swimming pool for the men measuring 60 by 20 ft.; adjacent to this will be twelve showers; and in the remainder of the basement will be six bowling alleys, twelve pool tables and a barber shop.

On the first floor will be a restaurant for the employees with accommodations for 970. The second floor will contain the restaurant for office employees, and will have capacity for 700. On the third floor will be the large club rooms, lounging rooms, library, etc.; and the top floor will be devoted to an assembly room which will be partitioned off into committee rooms, all of which can be thrown into a large assembly auditorium as needed.

In addition to this club work the Firestone factory has its medical department which was started twelve years ago, and which includes, a corps of medical attendants made up of a chief surgeon, resident factory doctor, two trained nurses for day work, one for night work, and a dentist. Arrangements are being made to take blood tests and conduct regular bacteriological analysis. In case of slight injury to employees they are taken to the factory hospital or home.

One of the latest acquisitions to the medical department is the dental office which has been opened in the factory, and which is conducted by a dentist of five years' experience. This department started Sept. 1, and is for the use of all employees in the factory who pay a nominal sum for work done. The factory expects to have all employees' teeth examined once a year.

In the medical department the Firestone company is starting a special series of examinations of all employees with the one thought of determining by accurate physical examination if the employee is physically suited to the job, or if there are other positions in the factory to which he is better adapted. By this department it is discovered, if perhaps, workmen with heart affection are engaged in heavy lifting, which would be dangerous. Such a person would be transferred to some other department.

Goodrich has for many years given very careful attention to its employees, both by means of a well-equipped medical department, to which has been added an efficient dental department, but the latest activity in this factory welfare work is that of installing rest rooms for the female employees of the office, one of which has recently been opened. This is an attractive room in the office building and is well fitted with suitable furniture, rugs, reading tables, etc.

In the medical department Goodrich makes a physical examination of every employee, with the thought of seeing if he is well adapted for the particular work he is doing. These examinations also have a salutary effect, and show the interest the company takes in the welfare of its employees. This department is well manned with resident physicians and nurses. The dental department is for the service of all the employees in factory and office. Tire companies are taking the lead in this welfare work, which must not be considered philanthropic alone, but which at the end of the year shows on the proper side of the ledger. The good health of the employees is a great factor in any factory. Goodrich has a large equipment of restaurants for its employees which are conducted much the same as those in other factories.

Some years ago the Republic company erected its club house for employees which has been operating with particular satisfaction ever since. In addition to bowling alleys, pool tables, gymnasium equipment, restaurant, club rooms, reading rooms, and many other amusements, many educational classes are carried on. The employees in factory and office took readily to the movement which is well patronized throughout the factory. In addition outdoor sports are cultivated.

Practically all of the larger factories are taking up the welfare work with medical attention in the factories. The Pennsylvania company has Paruco Park, the property of the company which is for the use of all its employees. Here is a gun club with a membership of seventy-five members, which requires annual dues of $1. In the factory are shower baths for certain departments, filtered drinking water at numerous fountains and the usual medical and restaurant arrangements.

Kelly-Springfield has carried on special welfare work and has started educational work with its employees. There are reading rooms for foremen and the usual medical attendants.

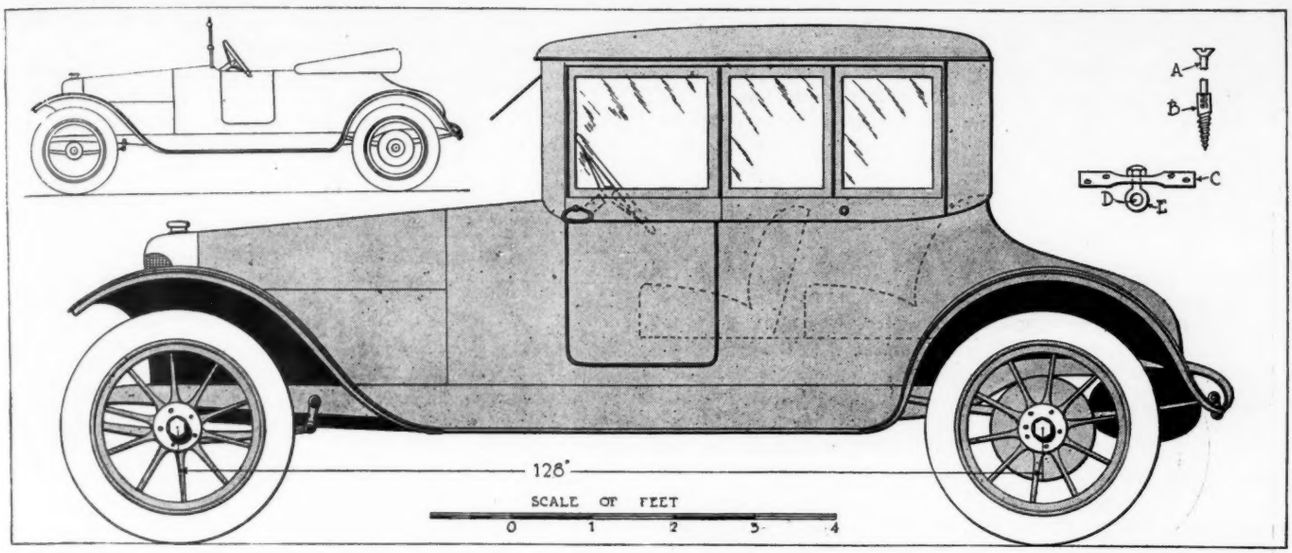


Fig. 1—Center—Appersen four-passenger runabout with suggested design of top added. Fig. 2—Upper Left—The same body with ordinary type of top. Fig. 3—C, D and E—showing how the supports are used in attaching the framework to the body. Fig. 4—A and B—showing how the screws used are made to insure their tops coming flush with the finished molding in securing the framework to the body

Two Demountable Top Designs

Entirely New Type of Body May Evolve from Present Closed Car Development—Types for Apperson Runabout and Chalmers Touring Car Chassis

By George J. Mercer

THE demountable top fitted to touring and runabout bodies is becoming increasingly popular each year, and the coming winter bids fair to outrival in numbers the total output of the past seasons.

The quality of the work and the designing both show improvement, which is no doubt due to the large number of good builders giving their attention to these matters. The demountable top has arrived at the stage where it is accepted as a staple article of manufacture that the public must have. Unquestionably the largest number used will be the type that can be sold complete and assembled on the body, for $75 to $150 as it is for cheapness that the top has come into existence and the majority of buyers are those who expect to economize.

A great range of possibilities is open to the body builder when converting the open body into a closed one. Some use the regular four-bow or the one-man top that is already on the car and simply add side glasses with a framework to hold them in place. In a few designs this addition is made in such a way that the top can be folded down by simply taking out the glass frames. In the majority, however, the entire framework has to be removed in order to fold the top, and this is done only at the beginning and end of the season. There is a considerable increase in the number of car manufacturers who provide a demountable top as regular equipment, and the number will increase in the near future. Eventually a new body design will evolve out of the present efforts.

Novel Body May Evolve

A very good business is being done by individual builders who specialize in converting the bodies in use into closed cars, and this affords a field for all the ingenuity that is latent in the body mechanic. The average body design is stereotyped before the public becomes familiar with it, and the body builder simply makes a copy, taking another body as a model. But supplying the demountable top is a free-for-all race, and it will be strange if in the near future a distinctively novel body is not brought out, that will be as distinctive as was the flush-side body type.

The standard forms of collapsible bodies of the better class, such as the landaulet and the cabriolet, have the distinctive look desired by the buyer who can afford the price, but the full leather top lacks the adaptability that the knockabout car owner needs. A fine carriage body is like a pair of shoes to many people; it only becomes comfortable about the time it is nearly worn out. The rough and ready demountable body, that does not involve the expenditure of much additional money, has the right seasoning to make it popular with a large number of car owners.

All Bodies Easily Converted

There are many manufacturers who are prepared to furnish tops for the standard makes of cars at short notice. They are equipped with forms that correspond with the bodies, and they only require the car, first long enough to check up the measurements, and then later on to assemble the top. All the modern bodies are easily converted, because the trimming roll at the top of the seats does not extend appreciably beyond the body line and the top line of the body is of such a shape that the assembling of the upper framework is not difficult. The worst feature is the adjustment of the hinges, that is, provided hinges are used on the upper part, as most touring doors are made to drop downward when open,

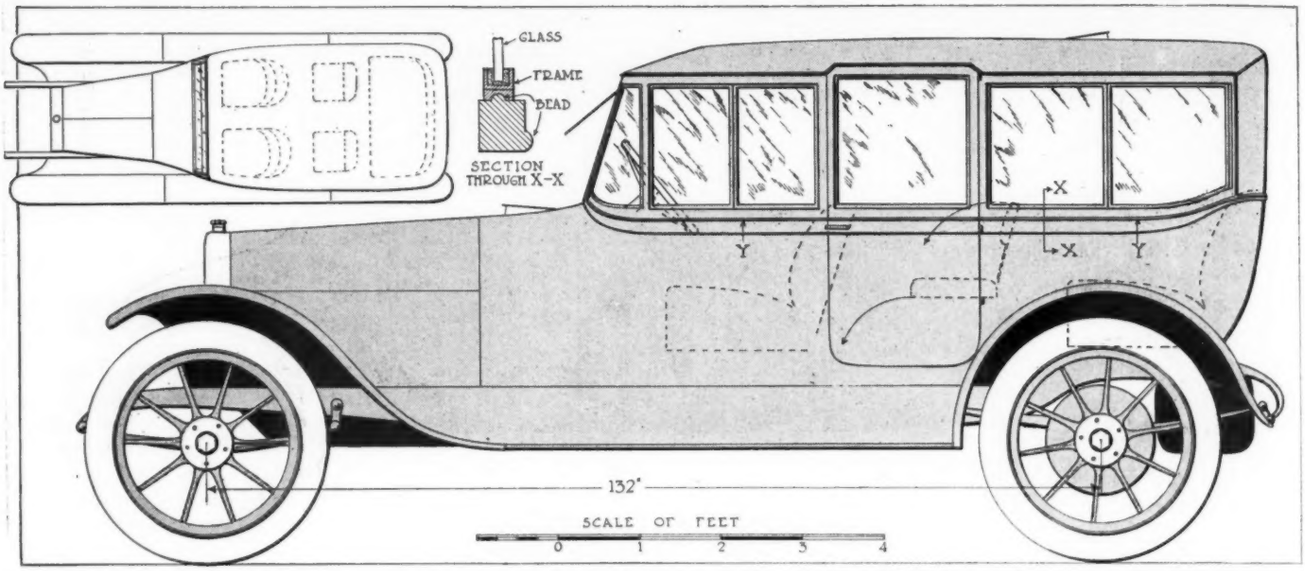


Fig. 5—A demountable top for a seven-passenger Chalmers touring car. Fig. 6—Miniature plan view of this construction, showing how the forward triangular glass is flat and stationary to follow the side sweep of the body toward the front. Fig. 7—X-X—showing how the four glasses on each side of the top are held in place at the bottom. The glasses are metal bound at the top and slide in a groove in the wood top rail, limousine fasteners keeping them tight. Fig. 8—Y-Y—showing the line of separation of top and body. A tee molding covers the joint and the glass side frames are provided with a lip that meshes with its companion glass frame, keeping out the wind and rain

and do not swing horizontally. A great deal of ingenuity has been used to overcome this, some builders making a complete new door that replaces the old one, others placing one long hinge at the top, which projects sufficiently to enable the upper part to swing true with the lower section, but the majority, especially the lower priced designs, do not attempt to have the hinges line; each section has a movement of its own and there is a finger projecting down on the inside of the upper section which engages in a slotted plate on the lower one, this finger traveling in the elongated slide and keeping the two parts in unison when opening and closing, the finger and slot compensating for the different lines of travel. A similar arrangement is made for the lock, the handles in the upper part operating the lock below.

An Apperson Runabout

Fig. 1 shows the Apperson four-passenger runabout with demountable top added and Fig. 2 shows the body without it. To make this top as illustrated, the bow top and the windshield are first taken off and the lower ash rail forming the support for the side glasses is fitted to the shape of the body top line; the rail is cut, part being attached to the door and part to the body and the cut must be made a little back of the door line in order that the part on the door will clear when opening. The jutting out of the added piece beyond the door panel enforces this cut being offset. The side rail continues around the back, the back part not being so deep, and uprights are framed behind the side glass and at each side of the back light; the latter is a separate frame and is screwed to the posts and toprail. The toprail is framed to the posts and the front pillars and the roof is formed with bows, sawed to form the shape of the roof corners, the front pillars are connected at the bottom by a bar that fits close to the cowl panel and the whole front is fastened by irons that engage in the sockets formerly used for supporting the windshield.

Framework Is Light

All the framework is light except the front pillars, and these must be wide to fill the space from the door to the windshield supports. The side glass frames are wood, 11/16 in. thick, and they are held in place at the bottom by resting over a bead, in the manner illustrated in Fig. 7, section *X-X*, the wood frame being grooved to do the same duty as the metal frame in the illustration. This bead keeps the rain from entering and at the top the glass frame rests in a rabbet in the toprail, the rabbet being open toward the inside. There are two limousine window fasteners for each frame, to remove or place the glass frames in position and the fasteners are screwed back until the frame tilts sufficiently to allow it to be lifted over the bead at the bottom. On the rear, the vertical edge of the door glass frame and the one directly back of the door, tee molding is fastened to cover the openings between the frames and at the rear of the third side frame; a rabbet in the post covers the opening, while at the front the pillar has a regular door rabbet. There is no framing between the front and rear side pillars and, when desired, all the side can be open, the four frames can be stored under the seat and the door glass frame is made to be turned down inside the door. The hinges for turning this frame down are placed inside with the centers on line with the bottom of the frame. When up, it is held stationary by two set screws that, passing through plates on the inside of the door top frame, engage in lugs projecting from the under edge of the frame that enter slotted plates on the top face of the framework.

Original Hinges Used

This glass frame forms the upper part of the door, it strikes against rubber bumpers on the toprail rabbet when closed and there are no other turning hinges used than originally are on the job. It projects back of the door line at the rear enough to line up with the line of cut in the framing, and at the front of it is back of the door line enough to give door bevel, so that it will clear when the door is opened and the frame is down. Also the hinge on the frame is long enough so that space is left between the frame and door to permit free operation of the link connecting the door handle in the framework to the handle of the lock.

The front windshield is in two parts; the upper is a visor and the lower swings inward for ventilation; the back light is square cornered and 13 in. high by 24 in. long is the maximum size, though it can be as much smaller as desired, the glass in this being stationary.

The roof can be all metal covered, or metal can be used to form the rounded corners and canvas or top cloth of any waterproof variety stretched over this and fastened under the moldings. The back panel will be metal also, while the lower side framing and front pillars will be painted wood.

Attaching the framework to the body in a manner that will leave few or no blemishes when the top is removed requires careful planning. Advantage is taken of the regular body top irons on the job to do most of the work of fastening as there are always four and sometimes more. In this case, the forward ones are quite long, and a cap is shown covering this. Diagrams *C*, *D* and *E*, Fig. 3, show how the supports are used; *D* is the gooseneck on the body, *E* is an eye bolt that slips over *D* and the end engages in a hole in plate *C* which is fastened to the upper framework. When assembling, the top is down until the four bolts *E* enter the plates *C* and the nut is tightened until *C* rests on the shoulder of the bolt. These bolts take care of the rear, of the top, and the trimming is left loose at these points so that the nuts can be turned up from the inside.

Forward of these supports, and on the doors, *A* and *B*, Fig. 4, are used. *B* is a lag screw with the head cut off, drilled and tapped to receive a 12-24 machine screw, and a sufficient number of the screws *B* are set in the top framing of the body and door, the top of the bolt coming flush with the finish molding.

The upper framing is carefully fitted to the body line, the holes in the bolts *B* located and the framing is bored and countersunk for the screws *A*. When the framing is very deep *A* and *B* will not suffice and, in addition, angle irons are used with one leg screwed to the under side of the framing and the other extending down inside the body. Screws are put through the trimming into the body frame and finish screws are put in all screw holes when the top is removed, this being also done with the screws *B*.

On a Chalmers Touring Car Chassis

Fig. 5 is a large seven-passenger touring body mounted on a Chalmers 132-in. wheelbase chassis and the top is modeled from the lines of the Brewster sedan. The door for this job is the same as for a closed body; it is in one with the top and the glass is made to drop into pillar slides and entirely disappear. The forward triangular glass is flat and stationary, pointing in toward the front, in order to follow the side sweep of the body as indicated on the miniature plan view, Fig. 6. This view also clearly indicates the shape of the windshield glass.

The other four glasses on each side are held in place at the bottom as indicated by the diagram *X-X*, Fig. 7. The glasses are metal bound at the top and slide in a groove in the wood toprail, while limousine fasteners keep them tight. They are placed in position by sliding in from the doorway, the posts at the front and rear of the door being made with an outer and inner member, the space between allowing the glass frame to enter. When not required, these four side glasses are taken out and stored under the seat, or one can be taken out to give extra ventilation and the companion glass can be pushed forward or back to control the air currents. As before mentioned, the door glass drops and is guided by a lift strap. This glass is frameless. The front windshield has the vision, the lower part is stationary, the ventilator in the cowl compensates for a moving lower windshield and there is also a ventilator in the roof. The back light is stationary.

Framing Up the Top

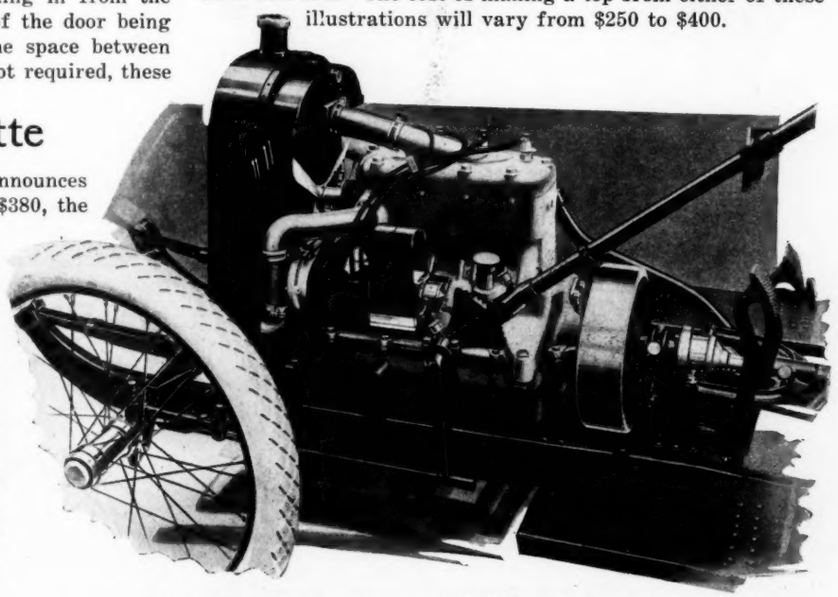
The method of framing up this top is identical with that described for Fig. 1. The line of separation of top and body is on line *Y-Y*, Fig. 5, a tee molding covers the joint, and the side glass frames are provided with a lip that meshes with its companion glass frame. This keeps out the wind and rain where the two frames join in the middle to form the sides at the back and front of the door. The same method of fastening is also used for top and body as shown in Fig. 1, and the door, being made for the purpose, has the lock handle in line to operate the lock without connecting links. The back panel is sheet aluminum in one piece from side window to side window; the roof can be of the same, or the round of the roof can be formed of metal as far up on the roof as where the radius of the corner starts, and then canvas or waterproof top material can be either drawn over the whole roof from side to side and fastened under the drip moldings, or the metal corners can be finished to paint and the roof cloth can form the center deck of the roof, being fastened under moldings running from back to front along the inner edges of the metal forming the corners.

The popular color for painting for the Brewster sedan is the color generally called battleship gray, and the finish is dull, while the part that here is designated as the demountable roof, would all be finished dull painted inside with no trimming of any description showing above the waist line, or the line that corresponds with the top of the seat back trimming, when painted inside. All the woodwork, such as the bows, etc., is nicely rounded and the framing shows very light in size. For Fig. 1, a suggestion for trimming that is commonly used is to cover the seats and backs, which are of leather, with slip linings and line the top with a similar material, this making a uniform appearance inside the body which is not too expensive.

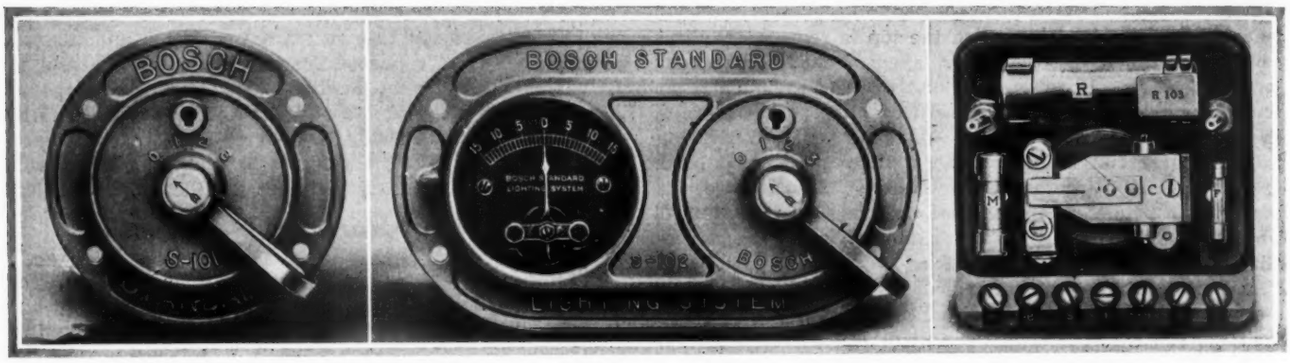
These two designs are drawn to scale and there is sufficient information conveyed to enable the top maker to duplicate them full size. The cost of making a top from either of these illustrations will vary from $250 to $400.

New Model Mobilette

THE Woods Mobilette Co., Chicago, Ill., announces a 1916 model Mobilette that sells for $380, the design being much the same as for the last model, but with a number of refinements. With a 104-in. wheelbase and 36-in. tread the little car is well proportioned. It has a neat four-cylinder engine 2⅝ by 4 in. bore and stroke, with a detachable head. Drive is through a leather cone clutch to a driveshaft with one universal and the gearset is integral with the floating rear axle. Ignition is by Bosch magneto. Two speeds and reverse are given. A feature is the underslung suspension of the front portion of the car, this being shown in the illustration, but the rear axle lies below the frame in the usual way, being attached to a pair of three-quarter springs. Seats are slightly staggered.



Front of chassis of the new model Mobilette, which is not a cyclecar



The switch of the new Bosch Standard lighting equipment combines an ammeter and full control for all circuits, while the switch can be locked. The cut-out, fuses and regulating ballast coil are in a separate box

New Bosch Standard Lighting Outfit

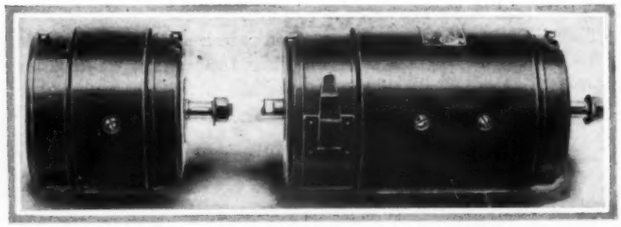
Generator in Two Sizes and Has Control for Any Lamps or Starting Motor — Is 12 Volt System

THE Bosch De Luxe equipment which has been known for some time has been supplied only in complete form with lamps and all accessories also of Bosch manufacture, and the purpose of the new generators is to suit manufacturers who do not necessarily desire to change equipment while wishing to employ a Bosch dynamo. The two models of the new type will be known as DSR3 and DSR103, the first being rated at 100 watts and the second at 80 watts. Each equipment consists of dynamo, control box and switch, making three units, and a battery, making the fourth, is necessary to control the voltage of the dynamo.

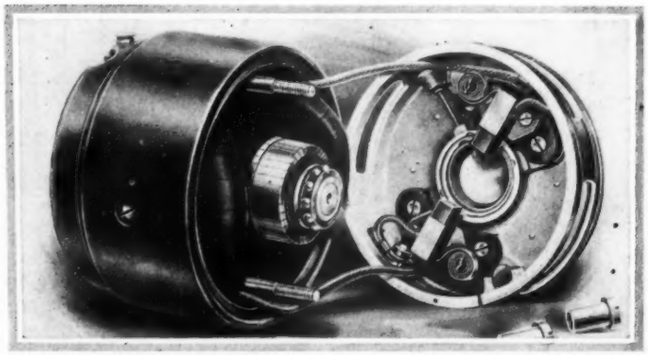
Inherent Regulation

For regulating the output of the generator the field magnets carry an additional winding which opposes the main winding, the amount of current flowing in these opposition coils being regulated by a resistance coil. If the speed of the dynamo increases and the current output rises, this affects the controlling resistance in such a way as to send current through the opposing winding on the magnets. This in turn, cuts down the strength of the field and so the current, thus returning things to normal.

The voltage is therefore determined by the battery, for as soon as the potential difference between the poles of the generator rises above the voltage of the battery when fully charged, the resistance comes into play and sends a restraining current through the field coils in opposition to the main shunt windings. Bosch Standard generators are designed to operate in conjunction with a 12-volt storage battery. It is claimed that the current capacity of the generator is sufficient to care for the full lamp load on an ordinary car, and the battery is needed only for starting or for lights when the engine is not running. The generator is mechanically of extremely neat exterior being sheathed in seamless steel tubing to which a pair of end caps are bolted after everything else is assembled. These caps are secured by a pair of long bolts passing from end to end, inside, so the generator is practically dirt proof.



The casing of the new Bosch generators are made from a piece of solid drawn steel tube and the machine is practically dust proof

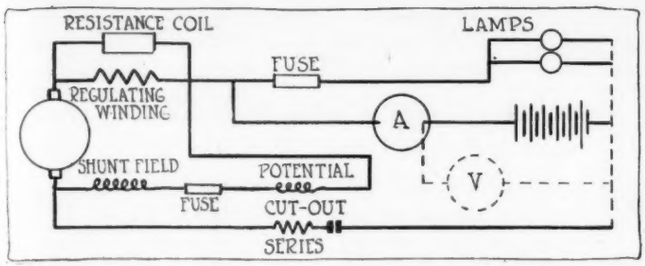


Showing the nature of the brush gear and the method for obtaining access to the brushes

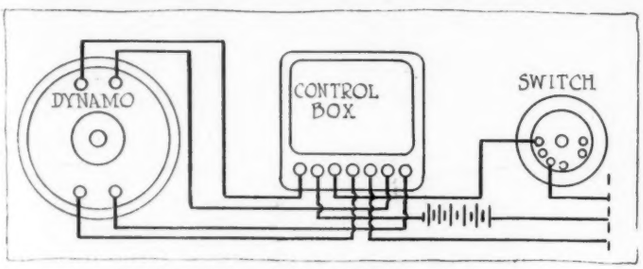
The armature is laminated and is almost entirely encircled by the windings on the two field poles, a feature of design that tends to reduce commutator sparking by damping out armature reactions. There are two brushes, mounted in strong spring holders within the commutator end cap, where they are well protected, and yet readily accessible for inspection as there is an opening of good size that may be uncovered by moving a strap which is held over the orifice by a special catch. To prevent any risk of current loss between the carbon of the actual brush and the clip which holds it, each brush is provided with a flexible conducting cable which goes direct to the terminal.

There are four external terminals, placed in the shaft end cap of the generator and these are clearly numbered, magneto fashion, so that there can be no mistake in making the connections to the external circuits which are shown in the diagram.

The controlling resistance coil and the automatic cut out are assembled in a separate small box together with the main fuse and a field fuse which latter prevents damage to the field coils should the battery become disconnected and voltage



General diagram of the complete Bosch Standard wiring system



Details of the wiring of Bosch switch unit

regulation consequently cease. The cut-out, etc., are accessible by removing the metal cover of the box which can be accomplished by unscrewing two cap nuts.

A remarkable feature of this new system is that it can be used either grounded, for a single wire layout, or with a double wiring system. The switch, which makes the third unit, combines an ammeter and ignition control for the magneto and has four positions, the first is "off" with both ignition and generator out. The second turns on both circuits, the third cuts in the tail and side lamps and the last adds the head lamps instead of the side lamps. The switch box is an extremely neat and ornamental unit in which compactness is marked and would normally be a cowl board fitting, of course.

Although, as stated before, the Bosch Standard equipment will be supplied in the form of the three units, generator, controller box and switch unit, for use with any accessories, the Bosch Magneto Co. will be prepared to supply complete sets of lamps, starting motor, battery, etc., if desired. A feature of all Bosch products is the high finish of every detail, and this will, of course, be maintained in the new equipment, both with respect to internal detail and outside appearance.

New Heinze System

Generator Has Integral Ignition Unit on Armature Shaft

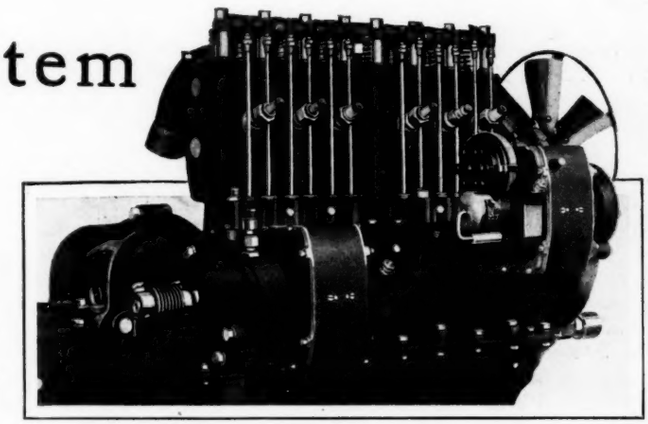
A NEW electrical equipment announced by the J. O. Heinze Co., Springfield, Ohio, is to be made in either single or two-unit form and has for its principal feature the combination of an ignition unit with the generator. The end of the generator is made up with a magneto type of distributer and the breaker cam mounted upon the armature shaft. All this ignition portion is removable and can be cleaned or adjusted with great facility in consequence.

For regulation of the generator output a vibrating reed is employed, this system permitting a tapered charge to be given the battery, a very large current if the battery is low, and a small supply when the battery is fully charged. The machines operate at 6 volts.

For the starting motor a Bendix pinion is supplied for flywheel engagement and it is stated that the electrical design of the motor is such that it produces a large torque with less current than usual.

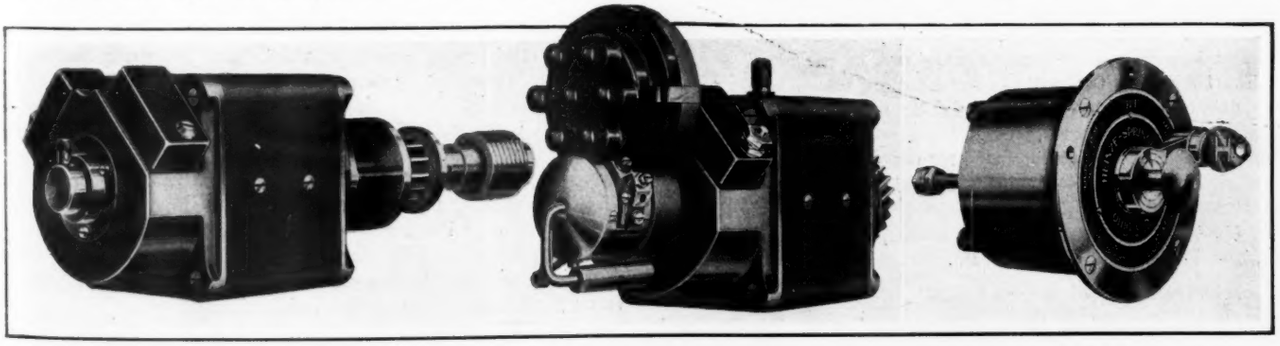
Special pains have been taken with the design of the switch unit, one lever controlling all circuits and giving various lighting combinations while the starting control consists of a button set in the center of the switch. A lock is provided whereby the switch can be secured in the "off" position.

Stress is laid upon the quality of materials employed, it being the makers' claim that by designing and selecting iron with the greatest care they have been able to produce a machine of high efficiency and low weight. Also the construction has been simplified so as to make possible rapid and inexpensive production without losing any of the high quality desired. As can be seen from the illustrations, the machines have a neat exterior with the square section customary on four-pole types.



Heinze two-unit system on light six engine

The factory has been prepared for the production of the new models with accuracy of workmanship as the goal, and it is stated that the inspection, both of details and of the complete machines is exceptionally careful. Each equipment is to be given an exhaustive running test.



Left—Heinze starting motor for flywheel application. Center—Gen erator and ignition unit. Right—Dash lock switch

The FORVM

ANOTHER PLEA FOR THE METRIC SYSTEM OF WEIGHTS & MEASURES —AMERICAN LEADERSHIP IN THE PISTON FIELD—ADVANTAGES OF AMERICAN ALUMINUM ALLOYS COMPARED WITH EUROPEAN

Advantages of Metric System

Details Worthy of Present Study Because of War Conditions

By Charles Vivier

EDITOR THE AUTOMOBILE:—The large volume of foreign business now being done by American firms in exportation of engineering products to Europe turns attention upon the metric system of measurement and makes it necessary for engineers to familiarize themselves more closely with its detail.

The average American reader has had ample opportunity, in the last few years, to observe that various measurements, especially in mechanical and scientific matters, are being given in ever increasing frequency in metric figures. Of late, with the European war, we not only hear of the horrible battle reports, but also our ears are dinned by the continuous sounds of millimeters, centimeters, meters, etc., the terms most commonly used in the metric system. Of all the numerous nations now engaged at war, England is the only one which has not yet adopted the metric system; in fact, the English speaking countries are the only ones which are not yet enjoying its benefits.

The American public should endeavor to familiarize itself as much as possible with the metric system, even if its inevitable adoption by this country is not yet near. The American invasion of metric terms is growing at such a rapid rate that it is obviously to our advantage thoroughly to get acquainted with the new intruders.

Some Special Points of Value

I will not attempt to give a complete description of the metric system; a good many text books have it. I only propose to bring out a few of its wonderful qualities. The fundamental unit of the metric or decimal system is the meter (Greek, "metron"-measure). It is decimal because every single unit is ten, or a multiple of ten, times larger or smaller than its neighbor unit. Therefore, the metric system follows faithfully the fundamental laws of our present universal system of numeration. Let us not overlook the above important fact. This is indeed simplicity reduced to its minutest expression. The direct result is that metric measures can be so easily remembered and compared; that metric calculations can be simply and rapidly made; that metric standards can be unequivocably and permanently created. A school child eight years old can without effort remember the whole metric line; how many grown Americans know the exact number of feet in a mile, how many square feet in one acre?

Starting from the unit, in numeration, we count up to 10; we do not arbitrarily stop at 12, or at 16, or at 64; if we did, we would hopelessly complicate our system of numeration. The American system of measures is confusing purely and simply because it deviates from the law of ten; because it is not decimal. If we insist upon dividing the units into ½, ¼, ⅛, 1/64, etc., instead of tenths, we get badly tangled up and have to suffer therefrom.

Interchangeability of Metric Units

The metric system is so perfect that even Sweden and Germany, the countries par excellence of rigorous mathematics, could not find room for improvements, and they adopted it without hesitation or reserve. Another splendid quality of the metric system lies in the fact that its various branches harmoniously correspond with each other; for instance, one cubic meter weighs exactly 1 ton, 1 liter (1 cubic decimeter) weighs 1 kg., etc. It also offers an easy choice of any unit such as most suitable for the requirements; for example, the millimeter will be chosen for small measurements as the bore and stroke of a gasoline motor, or for the bore of small firearms; the liter will be chosen for measuring the contents of an ordinary barrel, and so on.

Once the metric system was made known to the world, all nations had equal opportunities to welcome it; those with fortunate foresight adopted it at the psychological moment, that is before the enormous industrial development of the last fifty years. England with its customary apathy toward any idea of foreign origin, stubbornly refused its adoption. But of late the metric system has made great strides in the British Isles; the European war, with its vast possibilities of sweeping changes and reforms, may hasten its introduction into the United Kingdom.

For some unexplained reasons, the United States failed to adopt the metric system at the opportune moment, in the meantime, the clumsiness and unreliability of our actual system is being felt in direct proportion to the development of our trades and industries. Compared with the metric system, ours seems ridiculously antiquated. Our present needs demand a reliable measuring system; we also realize that the remedy for the trouble is very close at hand, yet we seem quite willing to get along with the old-fashioned tallow candle instead of the nitrogen electric light.

Difficulty of Change Increasing

On several occasions, the question of the probable introduction of the metric system into this country came up seriously, but each time the difficulties of the change loomed up so enormously great that the attempts were given up at their very inception. These difficulties are not unsurmountable. It is true that some of the European countries had some trouble in changing systems because some of their stubborn citizens insisted upon using the old measures; such trouble could not be experienced here because of the true up-to-dateness of the American public. We must not worry about the past, but rather about the future; our next generation needs a reliable measuring system, and we can afford to inconvenience ourselves a little now, especially so because the delay is making matters rapidly worse. The parcel-post and the federal reserve bank laws made a few malcontents, yet their value to the American nation is inestimable.

It must be admitted that the task of making the change of systems in this country would meet prodigious obstacles. In

addition to a considerable federal appropriation, the appointments of scientific commissions, etc., the opinion and suggestions of the greatest American manufacturers and economists would prove the most important factors in the proposed reform, which, if intelligently and gradually applied, could take place in a surprisingly short time.

Once the metric system is solidly implanted here, it would then be a favorable time to think about finishing up a few minor details like the adoption of the Centigrade thermometer and the final internationalization of the standards of mechanical and electrical power which are now badly intermixed with metric and old figures. For an ideal unit of power, we should greatly favor 1 hp. = 100 kilograms-meters-second, a well defined amount of energy, also a unit of power lending itself nicely to our present mechanical needs. It would be a comparatively easy matter, after a rational altering of the old electrical units, to make the kilowatt equal to the above mentioned new horsepower.

In conclusion, let it be known that the metric system is the most remarkable heritage of the French revolution of 1789, which abolished the ancient régime and the slavery in the French colonies. Among the many badly needed reforms, the newly-born French Republic was quite prompt to realize the necessity of a reliable system of weights and measures.

American Alloys Best

By Joseph Leopold

Engineer Walker M. Levett Co.

EDITOR THE AUTOMOBILE:—Continuing our well advanced discussion on the subject of aluminum pistons, it appears that there are still existing several skeptics who are not fully convinced that the aluminum alloy piston has long since passed the débutante stage and is now a product for standard production. It is my opinion—and I am not alone in this conviction—that the remaining skeptics are against the aluminum alloy piston solely because they have failed to come into contact with a reliable and improved mixture. As Mr. Sherbondy points out in his last article, the alloy piston was experimented upon by European engineers several years ago, but did not prove to be worthy of anything more than superficial consideration. May I not suggest here that the alloy experimented with was not what good aluminum alloy is at the present time? I do not believe it exactly fair to condemn aluminum alloy pistons in general, for the reason that *some* have failed to produce results. It would seem to me that America deserves that much more credit for producing an alloy which can show unfailing results. As pointed out in one of my former articles, before the war we were importing a metal from Germany by the name of magnalium, which metal I believe was used almost exclusively for alloy piston construction in Europe. Inasmuch as we were then unable to obtain a further supply, we were thrown upon our own resources to produce a metal in substitution—and luckily too—for we produced an alloy which showed a greater tensile strength and improved physical properties throughout.

Mr. Sherbondy's latest treatise—Analyzing Heat Flow—creates the impression that the American engineer is too hasty; that he has accepted the aluminum alloy piston on the strength of superficial considerations without regard to engineering value; that he has merely followed the crowd, disregarding logic; and that he is inferior to the European engineer in so far as originality, initiative and independence of thought are concerned. The Peugeot and several other cars were then cited as examples of superiority. In refutation of this assertion, I beg to refer to the recent Astor Cup Race, held at the Sheepshead Bay Track, in which five Peugeot cars started. It is my impression that these automobiles were constructed to the limit of European engineering skill—although they were perhaps handicapped by the war—but, as we all know, not one of them survived the race. If we trace the cause of trouble it leads us in the majority of cases to connecting-rod fracture and collapse; and if we investigate a trifle further we may arrive at the conclusion that piston construction was at the root of the whole difficulty.

American Engineers' Progress

Let us now consider the product of the American engineer—the Stutz cars which were first and second and the Duesenbergs finishing third and fourth. These automobiles were equipped with aluminum alloy pistons—the product of American manufacture—and yet they put all former records for the distance to shame. It may also be opportune at this moment to note that American cars hold first, second and third places for the racing season of the year 1915, all of which were equipped with aluminum alloy pistons. It appears to the writer that a more severe test could not be performed, and consequently the opinion is created that the American engineer is fast approaching the mark set by the European engineer.

Concerning Mr. Sherbondy's thermo-dynamic treatise; I concede that the theory advanced is not questioned, nor were my intentions ever to dispute it as it is now related, but quite unfortunately theory may not always be combined successfully with practice, and it is therefore mandatory that we consider actualities at this time, rather than mental conceptions, since the aluminum alloy piston has outgrown its embryonic period of progression. If I remember correctly, Mr. Diamond pointed out that a perfect oil film between the piston and the cylinder wall is non-existent, and in this event metallic contact between the cylinder wall and the piston would be prevalent. Consequently the method pursued for heat disposal would be that of conduction, and not convexion in so far as concern is permitted this factor.

With reference to accounting as negligible the heat given up by radiation in the piston, I beg to disagree, as I have ascertained by actual test that a ribbed head piston throws out its accumulated heat much more rapidly than a plain head piston. This theory is best substantiated by the practice of constructing a series of flanges on air-cooled cylinders, and the fact that a greater cooling area is exposed to the air.

Vibration and Fuel Consumption Factors

In reviewing Mr. Sherbondy's conclusions as to inertia force, I notice some intimation as conceding that same is of some importance, although it is stated negligible as far as commercial production is concerned. The paramount point which may be tendered to uphold the aluminum alloy piston in the respect of commercial production is the fact that vibration is reduced and fuel economy affected, even if high speed is not taken into consideration. The latter mentioned, however, is inevitable in the future design of motor vehicles.

Consider the Service Station!

Automobilists do not seem to realize the importance of planning ahead for their repairs and adjustments. The majority of work done on a car might just as well be done next week as last week. However, many motorists make the mistake of dropping into the service station unexpectedly and insisting that the car be done by a certain time. Often these demands work no hardship because the shop is slack but just as often, the shop is already overloaded with work, and additional customers mean overtime work.

The History of the American Automobile Industry—5

Further Development of Steam Carriages—Public Prejudice Against Them—First Applications of Steam and Other Motor Power to Bicycles—Gas Engine Makes Progress

By David Beecroft

¶ Review—Last week the development of the electric vehicle was traced from 1800 to 1880, which year marked the beginning of the present practical era. This account also dealt with the application of electric power to boats and for other purposes, including the first street cars, running in 1832. It was in 1837 that hot tube ignition, which in later years found very extended use, was brought out. A patent taken out in 1844 embodied a number of valuable features, among which were the use of liquid fuels, a type of carbureter, compression of the fuel, flame ignition, air cooling and a clutch. Armored cars were mentioned at the time of the Civil War, a matter of interest in view of their practical development and use in the great European conflict now being waged. This week further developments in the application of steam to carriages, velocipedes and bicycles are taken up and the growing interest in the problem of self-propelled vehicles outlined.

ALTHOUGH the Civil War called American energy into other lines, the automobile idea did not wholly die, but was kept alive by several inventors. One of these was the well-known steam engineer, Sylvester H. Roper, 1826-1899, who began his various experiments as early as 1859. Until his death in May, 1899, he never wholly ceased this work, doing a mile on the Charles River track, Boston, Mass., in slightly over 2 min. on his latest model motor bicycle. While his preference seems to have been steam, he also built a four-wheeled vehicle driven by a hot-air engine, and later a four-wheeled steam buggy. During the velocipede craze of the later sixties, he fitted several of these with steam motors. Roper's persistence as well as his reputation did much to educate New England people to the steam vehicle, and the ready acceptance of the little steam cars about the time of his death can undoubtedly be partly ascribed to the educational work done by him. His last steam buggy was sold to William Holmes, a prominent brick maker of Boston, in 1894.

Roper's Steam Carriage

Roper's steam vehicle of 1863 seems to have been a conventional four-wheeled carriage for two passengers driven by a 16-in. boiler and having a water tank at the rear. The engine was of about 2 hp. and coal for the day's use was carried under the seat, the estimated cost being about 1 cent per mile for fuel; 15 to 20 lb. of steam are said to have been sufficient to operate, but more could be used, 60 lb. being mentioned in one description. The weight was 650 to 700 lb. and speeds up to 20 miles per hour possible. It will thus be seen that this vehicle was a very excellent construction, considering the time when it was made and that its influence shows very plainly in the steam vehicles brought out over 30 years later.

Public Against Steam Carriages

It may seem queer to our readers that with such light construction and such evident practicability as some of these steam carriages of this period showed, they did not win recognition and become a commercial success. The comments of the *Scientific American* editor in January, 1865, throw light on this matter. He says: "Public opinion is against the steam road carriage. Many have been made, but those existing and in use can be counted on one's fingers." He mentions the effect of the continuous jarring, although why a light carriage driven by a two-cylinder steam engine, such as Roper used, should jar as much as a carriage drawn by a horse feels the jerky stepping of the horse, he did not explain. He adds that they will never come into common use and could not be practical unless one was willing to be one's "own engineer and repairer." His conclusion, and, doubtless that of many others, was that the mechanical road carriage was a "long way off." In this he proved correct, but not because of the inability of mechanics to build a satisfactory carriage. Public opinion, still strong 25 years later, was at fault and much educating is even to-day required to get new things accepted, regardless of how good they are. Verily, we need open minds.

Another New England inventor by the name of Spencer made one or more steam carriages about 1863 or 1864, and ran them on public streets and highways. About 1868 W. W. Austin of Lowell, Mass., built a light steam vehicle which he drove about the country for several years while exhibiting it. The boiler was horizontal and placed lengthwise of the vehicle, which was of steel. The weight of the boiler was slightly under 100 lb. and hard coal was used for fuel. It is said that "a few cents' worth went a long way."

A Steam Man

A fantastic attempt which displays rather more ingenuity than good mechanical judgment is shown by United States patents to Z. P. Dederick and I. Grass of Newark, N. J., in 1868, covering a

steam man attached to the thills of a wagon and supported thereby while he pulled it along the road. A steering wheel and also a controlling wheel permitted the man to be guided and controlled. Some of our older readers will doubtless remember having seen this mechanical curiosity. When seen by Charles E. Duryea, the man was supported by an arm projecting horizontally from the center pole of a show tent, around which he walked when started. Other than as a curiosity and as an example of a light high-speed steam engine, and an ingenious application thereof, the device had no practical value, but its exhibition in many places did emphasize light steam engine construction. So fast did the engine run that it advertised itself by a musical hum.

Large Demand for Power

The rapidly growing Central West was developing a large demand for power since heat and water power were not available as in the more mountainous and wooded East, and this demand undoubtedly stimulated engine experimenters to produce simpler and better forms of engines without which the automobile was not possible.

$5,000 for an Iron Horse

This demand was quite generally felt and inventors very naturally responded to the best of their ability. Just the form of vehicle demanded was not clear. The horse being the accepted motor was naturally the suggestion followed by some. The president of a Philadelphia street railway company offered $5,000 for an iron horse that might be used as a substitute for the street car horse. That he really expected the device to look like a horse may not be true, but the publication of this offer in the journals of 1875 substantiated this thought. Coupled with this was another thought that anything odd scared horses, and many inventors attempted to lessen this feature by making the device resemble a horse as nearly as possible. Many vehicles were constructed and several patents issued, showing horse-like structures, propelled by leg movement, and also mounted on wheels, which wheels were driven in the more common manner. Not only was this true in America, but also abroad, two steam horses being shown in France in 1875.

$10,000 for a Practical Road Vehicle

So important did this need for mechanical traction seem to be that the Wisconsin Legislature voted an award of $10,000 to be given to the inventor who should demonstrate by a 5-year test that his vehicle could traverse common roads in a really practical manner. When the road conditions then exisiting in Wisconsin are considered, it will be seen that this reward was pitifully inadequate, but it undoubtedly did much to stimulate mechanical activity along this line.

Some people protested against raising the hopes of poor inventors who had no real knowledge of the problem, which was thought by many to be unsolvable, but the offer probably did more good than harm, although its conditions were so severe that its time limit expired before the practical vehicle appeared.

H. S. Taylor of Derby Line, Vt., was a very intelligent experimenter who finally gave up the problem because the power required seemed so greatly in excess of the results to be gained. He had not only watched the experiments of others, but had made in 1876 one vehicle at least, driven by steam, which was as light as 500 lb. His conclusion after having tried so light a vehicle, points very plainly to the fact that the roads were not yet good enough for success, and he did not see any way, with the materials and the mechanical experience then available, to make the vehicle overcome the road difficulties.

So fully recognized was this demand for power road vehicles that the Franklin Institute, aiming to lead in scientific matters, published early in 1876 an article in which it strongly advocated the use of steam carriages.

Interest in Problem Grows

Another manifestation of the growing interest in things mechanical, which resulted in an enormous dissemination of mechanical knowledge, was the Centennial Exposition held at Philadelphia in 1876, in commemoration of our country's first century. No better index of this mechanical growth exists than that shown by the records of our Patent Office, which, prior to 1865, did not show more motor vehicle patents than could be counted on one's fingers, and a total issue of less than 50,000 patents, which total issue reached 200,000 early in 1878, an increase of 300 per cent in 13 years. The 400,000 issue was reached early in 1889 and the 600,000 early in 1898. Naturally it is impossible to continue the general history with any degree of total inclusiveness because of the vast amount of work being done which had a bearing on the final solution. Much of this work, however bore more directly on the traction engine, the street car and the locomotive, while the efforts toward the road motor vehicle driven by steam comparatively slackened.

Gas Engine Development

The development of the gas engine had by now, 1876, reached such a point as to attract serious attention for stationary power and boat work and pending its development sufficient for motor vehicles, the road vehicle movement somewhat languished. The velocipede had ceased to attract attention and although it continued in use in England to such an extent that races were held there and was shown at the Centennial Exposition in the form of a high-wheel bicycle it did not attract much attention in this country until about 1879. The bicycles exhibited in 1876 were sold and a few others imported, but, being of the high-wheel type, were considered rather as vehicles for athletes than for the common people. Thus the cycle industry did not make much headway until the advent of the safety bicycle and the adoption of the air tire in the later eighties.

The Rostrum

Worn Thrust Bearings Cause Noise

EDITOR THE AUTOMOBILE:—I have an Apperson 1913 4-45 car on which I would like to make an adjustment of the differential. An unpleasant sound issues from the rear wheels when traveling over 20 m.p.h. and I have found that there is a little play in one of the rear wheels. By play, I mean that when rear wheel is jacked, same can be pushed in and out about ⅛ or ¼ in. The trouble I am sure is not beneath the hub cap as I had tightened this nut, and I think that the differential itself must be adjusted. How can I adjust it so as to stop this ringing, grinding noise?

I have noticed this same noise on quite a few passing cars. I also might mention that on taking off the cover plate of the differential I have found that the edges of teeth of the large gear have been chipped. The chipping I am sure had occurred when the car was on rough road, such as heavy sand or mud and think this was caused by the gears not meshing properly. This had happened on quite a few occasions and every time it had happened I was forced to take these chips out as some had lodged between the teeth, causing a jar through the whole car while going. I also notice that my motor is consuming quite a lot of oil of late, which I think is caused by the oil pump working too fast. There is an adjustment screw on the bottom of the motor where the oil supply can be regulated and also a petcock up above showing how fast oil is pumping, but before adjusting I would like to know just how it should show.

Brooklyn, N. Y. P. K.

—The lost motion in the rear axle appears to be due to worn thrust bearings. If the car will be examined by a competent mechanic it is quite sure to be noted that the differential thrust bearings are badly worn and need replacing.

This same reason may possibly be assigned to the noise about which you speak, although this may also be attributed to the condition of the ring gears and pinion. These should be examined at the same time that the thrust bearings are replaced and the differential overhauled.

After a motor is loosened from running the amount of oil required is considerably less than when the motor is new. For ordinary driving the Apperson company recommends that the adjusting screw at the bottom of the pump be closed entirely and then opened three-quarters or seven-eighths of a turn. Of course, if you undertake long trips or run the car under unusual conditions such as through heavy mud and sand more oil will be required and the adjusting screw should be opened accordingly.

Excess Oil Due to Piston Leaks

Editor THE AUTOMOBILE:—Have a model C-25, 1915 Buick touring car which causes me a great deal of trouble by excess oil getting by piston rings into the combustion chamber, fouling plugs and causing carbon deposit.

Have had a new set of rings put in the car but still have the same trouble, although I keep the oil level low in the crankcase.

Would it be advisable to take out the pistons and have an oil groove cut in them, with small holes to let out surplus oil?

If so, would you kindly advise where to place the groove, also the depth of groove and number and size of holes to each groove? Is there any other remedy you could suggest?

2—Would the wiring diagram for an ammeter for the 1914 B-25 Buick be suitable for the C-25, 1915 model? This is shown in THE AUTOMOBILE for Oct. 21.

Pittston, Pa. W. E. S.

—Excess oil in the model C-25 Buick can generally be traced to badly fitting piston rings, scored pistons and scored cylinders. It sometimes happens also that a car user carries too much oil in the reservoir. All these should be examined and the obvious remedy applied.

2—The ammeter for the C-25 can be wired in the same manner as that for B-25 with the exception that on the C-25 it will not be necessary to take the generator apart to cut the strap.

Improper Spark Timing Causes Heating

Editor THE AUTOMOBILE:—Can a honeycomb radiator be cleaned of scale or other matter without taking it apart, and if so, how?

2—What effect would a solution of lye have on the different metals and rubber if it were put in the radiator and the engine run for an hour or so? How would sal soda affect these parts?

3—On my 1914 Velie the spark is set on upper dead center when full advanced. This I know is too late but it should not heat the motor to the degree of boiling while running in fourth speed on level paved roads. The pump is working well and the water seems to be fairly clear. This leads me to believe the trouble is in the radiator as some of the cells in a straight line from top to bottom seem to be much cooler than others. What would you advise me to do with it? The cylinders are free of carbon.

Euclid, Ohio. L. H. V.

—A honeycomb radiator can be cleaned by a solution of common washing soda and water. The proportion is roughly a double handful of soda to a pail of boiling water. The radiator is flushed with this which will remove the scale.

2—Strong alkaline solutions such as you mention would rapidly corrode the parts by setting up an electrolytic action.

3—If the spark is on dead center when fully advanced, it is the cause of all your troubles, because it should be just the other way and be on dead center when fully retarded.

New Facing Remedy for Slipping Clutch

Editor THE AUTOMOBILE:—I have a 25-hp. Maxwell runabout built this year which I bought in June. The clutch is faced with some fabric and for the past month I have been bothered by the clutch slipping. Have had the garage men put Fuller's earth on the face but of no avail; evidently the face is so smooth that the earth will not stick.

Will you kindly suggest a remedy, as the results are very annoying? The car will stand in the middle of the street on high gear and not affect the running of the engine, that is, the clutch in high will not retard the engine to any appreciative degree, although it will hold on low and second but better in the former.

Bradford, Pa. E. C. C.

—There must be something radically wrong with the particular facing on that car and would suggest your having a new clutch facing applied. If this does not remedy the trouble there must be some interference with the clutch entering the flywheel as far as it should. Perhaps the clutch pedal is striking the floorboard preventing it from engaging. As this trouble has not been noticed in any large number of Maxwell cars it is no doubt due to some local derangement.

Fuller's earth has little or no effect on the clutch lining used in these cars. It is very possible that heavy grease has leaked into the clutch housing and that the lining is more in need of thorough cleaning than anything else. If you will follow the directions given in your instruction book and lubricate with a very light oil, one of the possible causes of trouble will be removed.

Layout of 40 by 90 Ft. Garage

Editor THE AUTOMOBILE:—I am going to build a brick garage 40 by 90 ft., and would like to have you show me the ideal layout for its equipment. I want to use a vulcanizing plant, a lathe, a motor generator, charging set for batteries and such other equipment as necessary for an up-to-date repair shop.

Please list the necessary equipment and where I can secure it. What type of lathe would be best to buy and kindly give me a floor plan of an up-to-date garage of this size.

Montgomery, W. Va. W. C. A.

—The layout which would probably fit your desires better than anything else is shown in Fig. 1. As regards the necessary equipment, that which you have mentioned and a sensitive drill, together with a set of bench tools, will be about all that you will need to start. It will not be necessary to buy this equipment new, as it is better to pick it up wherever opportunity is found.

No Accidents in Elgin Race

Editor THE AUTOMOBILE:—What is the piston displacement of an eight-cylinder motor 3⅞ by 6?

2—What makes of cars and what drivers captured the first five places at the Elgin trophy race? Give time in miles per hour and the prizes.

3—Were any of the drivers killed or injured?

4—What is the difference between a storage battery and a dry battery?

5—Could electricity be used to heat the steam generator on the Stanley car instead of gasoline? If not, why?

6—Is the Stewart starter on the Ford noiseless in operation? Could it be made to operate in either direction?

7—Has the Mercer company retired from racing? If not, why didn't it race this year?

8—Do the valves of the Knight engine require grinding? Or do they need the attention that the valves of a poppet engine require?

9—Is there an electric motor built which can be run in either direction? How is an electric car reversed?

10—Could electricity be used to heat water in any way? If so, how? Give full details.

11—Could compressed air be used in a steam or water turbine in place of steam or water? Would 100 lb. continuous pressure operate a 20-hp. turbine satisfactorily?

12—Where is the Ahems Fox car made? By whom?

Cooper, N. C. S. T.

—The displacement is 566 cu. in.

2—At the Elgin trophy race this year only four cars finished. These were Anderson's Stutz, Cooper's Stutz, O'Donnell's Duesenberg and DePalma's Mercedes in the order named. The speeds in m.p.h. were 77.256, 76.258, 75.769 and 75.690. The prizes for the Elgin trophy were $2,000 for first place, $650 for second place, and $350 for third. In addition to this the drivers all received $100 for each 100 miles completed.

3—There were no accidents.

4—A storage battery is one in which the chemical condition which creates an electromotive force can be restored by causing a current to flow into the battery. A dry battery is one in which the current is produced by chemicals contained within a waterproof case and which is of such a nature that once it is exhausted the battery cannot be again used.

5—There would have to be present some great source of electric current which would be capable of producing enough heat to provide the high temperature required. This, of course, would be impossible.

6—There is no mechanical mechanism of this nature which is absolutely noiseless and it is a matter only of degree of noise. It is quiet in operation. The Stewart starter is designed to operate in one direction but probably could be altered if necessary.

7—The Mercer Co. has not announced that it has retired definitely from racing, although the company did not concentrate any great attention on the matter this year.

8—No.

9—Electric motors can be run in either direction by reversing the flow of the current.

10—Yes. The flow of electric current through any resisting medium provides heat.

11—This would depend on the details of design.

12—THE AUTOMOBILE has no record of this car.

Gear Ratios of 1909 Packard

Editor THE AUTOMOBILE:—I have a Packard 30 runabout, 1909 model, and would like to know the actual horsepower.

2—What are the gear ratios? How many revolutions per minute does the motor turn at full speed? What is the bore and stroke? What speed can the car attain if in good condition? I have never driven it to the limit, but have passed cars which claim 60 m.p.h. and over.

3—Will a 36 by 4½ Kelly-Springfield Kant Slip tire give proper service on the rear wheels? I now have 37 by 5, but would like to put on the smaller size.

4—How many miles per gallon of gasoline and oil should I obtain on good roads at an average speed of 18 m.p.h.?

Mattapan, Mass. H. F. M.

—The motor in the 1909 Packard 30 runabout will develop about 50 hp.

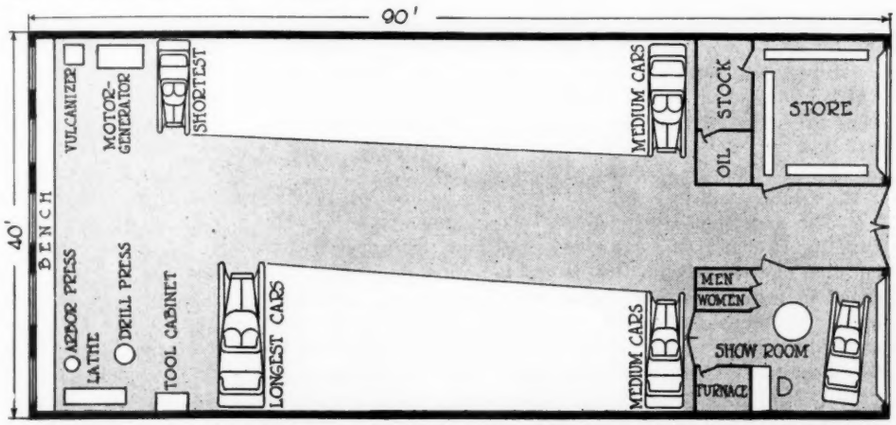


Fig. 1—Suggested layout for a 40 by 90 ft. garage, showing placing of vulcanizer, lathe, generator, charging set for batteries, etc.

2—This model was supplied with two gear ratios, one of which was 3.21 to 1 in which the pinion and ring gear had fourteen and forty-five teeth, respectively, and one of 2.64 to 1 in which the number of teeth were seventeen and forty-five, respectively. The motor develops its maximum horsepower at about 1200 r.p.m. While the speed at which the car will travel depends upon the gear ratio employed, when in this condition it should be able to travel 60 m.p.h.

3—The 36 by 4½ tire size should be adequate for this model when equipped with a runabout body unless unusual loads are carried.

4—The gasoline and oil mileage on a car of this age are difficult to estimate. It should be possible, however, to obtain better than 12 miles to the gallon of gasoline and 150 miles to each gallon of cylinder oil.

Relay Points Not Easily Adjusted

Editor THE AUTOMOBILE:—I have a 1915 model 31 Empire, with a Remy electric system. I just installed a new relay and the fuse burns out almost as quickly as I put them in. The points are not pitted. The generator is all right and there are no grounds or shorts anywhere. I think the trouble is improper adjustment of the relay points. Can you please tell me how to adjust a Remy relay?

Canonsburg, Pa. F. G. S.

—While it is possible to adjust the Remy relay satisfactorily, such adjustment should not be made by anyone who is inexperienced in this work, and if the relay has not been tampered with and thrown completely out of adjustment if you will see that the large regulator points have a maximum opening of approximately 0.02 in.; that they are clean and not pitted and also that all connections are properly made securely with the wiring in good condition, the troubles should be obviated.

Ratio in New Sheldon Axle

Editor THE AUTOMOBILE:—What is the ratio of the worm to the master gear in the Sheldon axle for 1500 lb. capacity cars as described in a recent issue of THE AUTOMOBILE?

2—What was the ratio of the gears in the axle on the car driven by Resta at Chicago?

3—Are aluminum cylinder castings usually lined with cast iron?

4—Was it for lack of speed that the Porter sleeve valve cars were unable to qualify at Indianapolis?

Kansas City, Mo. W. E. B.

—The standard ratio in this axle is 6.5 to 1.

2—The ratio of these gears was approximately 3 to 1.

3—Many recommend the practice of lining aluminum cylinder castings with a cast-iron sleeve.

4—No.

Truck Knocks at Low Speed

Editor THE AUTOMOBILE:—I have an Alco 3½-ton truck which has a knock in the motor. It appears only when running idle and at slow speed. It also disappears when the spark is retarded. Could this be a loose wristpin or a piston slap?

Blue Island, Ill. W. H. S.

—The fact that the knock or pound appears only when running idle and at slow speed, but does not appear when running slow in gear, indicates nothing, as of course, at slow speed in gear, the motor has a wider throttle opening than at the same speed idle; also the inertia of the truck acts as an additional flywheel, so that it may be assumed that the trouble appears only when the minimum throttle opening is used.

That the retardation of the ignition results in the disappearance of the knock indicates that it is in all likelihood a spark knock. An engine in proper shape should not knock when idle, but nevertheless in heavy engines it often happens that with the throttle nearly closed and the spark fully advanced the motor will knock. The sound is a sharp click, somewhat like the sound of one bottle being hit against another.

A piston slap, a loose wristpin or any other mechanical cause would be unaffected by changing the spark adjustment.

Motor R.P.M. at 50 M.P.H.

Editor THE AUTOMOBILE:—On a car with 34-in. road wheels and the engine geared 4 to 1, how many revolutions per minute does the engine make at a speed of 50 m.p.h.?

2—In descending a long grade is it harmful to hold the car in with the brake, while the machine is in gear, the clutch in and the engine idling?

Reedsville, Pa. F. E. K.

—On a car with 34-in. wheels and 4 to 1 ratio at 50 m.p.h. the road wheels make 494.4 r.p.m. and the motor with a gear ratio of 4 to 1 makes four times this amount or 1977.6 r.p.m.

2—As long as the car is tending to push the motor, it does no harm to keep the clutch in while the brake is applied.

Correct Timing for 1912 Regal

Editor THE AUTOMOBILE:—Will you kindly give me the timing of a 1912 Regal 30-hp. touring car? I have had the motor down and think that the valve and magneto timing is wrong because it backfires. I have tried different carbureter adjustments but with no success.

Roselle, N. J. C. P.

—The magneto in the 30-hp. car should be set so that the spark will occur at the instant the piston reaches the uppermost point of the compression stroke. In other words, on upper dead center with the lever in full retard position. The timing of the magneto can be altered by changing the position of the small timing gear on the end of the magneto shaft, but to make this adjustment it is necessary to remove the radiator and the timing gear housing.

If the magneto is timed a little too early this can usually be corrected by merely changing the position of the timing gear on the end of the magneto shaft one tooth to the left facing the engine from the front. If the magneto is timed late, or, in other words, if the spark occurs after the piston has traveled down a part of the distance, the timing gear at the end of the magneto shaft should be set one tooth to the right, or perhaps two if necessary. Changing the gear one tooth means approximately 1 in. on the face of the flywheel.

The timing of the valve is indicated on the flywheel by the figures 16, 34, 40, 10, ¼ and 2/3. These lines and figures represent distances and measurements in degrees from the two lines diametrically opposite to one another, one marked 1-4 and the other 2-3. These two marks coincide respectively with the upper dead centers of 1 and 4 pistons and 2 and 3 pistons.

To determine whether or not the valves are timed properly, first open the relief cock on top of the cylinders, then turn the flywheel to the left until the line marked 1-4 is opposite, or rather directly under the center line of the cylinders. At this point the exhaust valve in either No. 1 or No. 4 cylinder should just commence to close. If you find that the exhaust valve in No. 4 cylinder is beginning to close, and you wish to check up the valve timing of No. 1 cylinder, turn the flywheel around to the left, one complete revolution, until the line 1-4 is again brought under the center line of the cylinders; then continue slowly turning the flywheel about an inch or so to the left until the line marked 10 coincides with the center line of the cylinders. This is the point at which the exhaust valve in the No. 1 cylinder

should just seat itself or close. To determine whether or not the valve is seated, see if the tappet or push rod underneath the valve can be turned with the fingers. If the tappet turns freely the valve is seated, and if the tappet is hard to turn, that will show that the valve is still being held slightly open. If this is the case, loosen the lock nut on the tappet screw and turn the screw down until the valve just seats; then turn the lock nut down tight against the tappet.

To check up the timing of the inlet valve in the same cylinder, turn the flywheel ¾ in. or so toward the left, until the line marked 16 comes under the center line of the cylinders. At this point the inlet valve in the No. 1 cylinder should just begin to open. Turn the flywheel a little better than one-half a turn to the left, stopping when the line marked 34, three lines to the right of the 2-3 center line comes in line with the center of the cylinders. At this point the inlet valve in the No. 1 cylinder should just close.

To see if the exhaust valve in the No. 1 cylinder opens at the proper time, revolve the flywheel three-fourths of a turn to the left, and stop when the line 40, the first line to the left of the 2-3 center line comes in line with the center of the cylinders. This is the point where the exhaust valve in No. 1 cylinder should just begin to open. The above completes the timing of cylinder No. 1.

To time cylinder No. 2, turn the flywheel until the line marked 2-3 is in line with the center line of the cylinders. If the exhaust valve in the No. 2 cylinder is closed, turn the flywheel through one complete revolution, until the line 2-3 is up again; the exhaust valve in No. 2 cylinder should then just be starting to close. Proceed now as in timing the No. 1 cylinder.

The No. 4 cylinder is timed from the center line 1-4 and the No. 3 cylinder from the center line 2-3. When the valves are closed there should be clearance between the valve stems and the tappet screws of from 0.003 to 0.004 in. This amount of clearance is necessary to allow the valves to seat tightly.

Racing Record of Meneghetti

Editor THE AUTOMOBILE:—Kindly give me the racing record of Meneghetti, an Italian, who drove a 120-hp. Fiat. He was killed, I believe, at Savannah when his machine turned turtle.

Charlottesville, Va. C. E. S.

—Louis Meneghetti came to this country some time during 1910 or 1911 and for about two seasons campaigned with the Moross racing team.

In September, 1912, he severed his connection with this team and joined another team then known as the Powell racing organization and competed in several dirt track meetings during that season. In 1913 he competed in some small dirt track events independently and at Norfolk, Neb., on Nov. 17, 1913, his Fiat turned over as he was rounding the turn and Meneghetti was killed.

How Oil Is Consumed

Editor THE AUTOMOBILE:—What is considered a reasonable consumption, by a four-cylinder motor 3⅜ by 4½, of light, medium and heavy oils? Kindly explain how the oil is consumed; also the different ways it can be wasted or lost?

2—What is the function of the small holes through the cylinder walls?

San Francisco, Cal. J. G. H.

—Three hundred miles per gallon would be reasonable; 600 would be good.

Oil is consumed merely through burning in the combustion space. Every time the piston goes down, it leaves the cylinder walls wet with oil and this oil is burned off. This action occurs even when no smoke is emitted. Oil usually wears out by continual passage through bearings, and becomes dirty. It can be restored by boiling, screening, etc., but the trouble is more than the oil is worth.

2—There are no automobile motors with holes through the cylinder walls. Probably you mean the piston. Small holes through the piston are a factor in preventing too great an accumulation of oil on the cylinder walls, as well as in reducing the weight of the piston without impairing the strength.

Ford Magneto Develops 7.5 Amp.

Editor THE AUTOMOBILE:—Can you tell me what amperage is developed by the magneto of the Ford 1915, model T, at different speeds, taking as a minimum 15 m.p.h., also at 20 m.p.h., and at 30 m.p.h.?

Kindly name the defects of this system of lighting, and tell me how I can secure more even lighting at the different speeds.

Hamburg, Pa. C. E. K.

—The Ford magneto at 15 m.p.h. develops its maximum amperage which is quite close to 7½ amp.

As the current generated by the magneto varies according to the speed of the motor, it naturally follows that at very low engine speeds the lights will not be as bright as when the motor is turning over faster. However, for all ordinary purposes, sufficient light is given by the headlamps. The present 9-volt bulbs were determined upon because they provided the best light at the widest range of engine speed. If an owner desires to drive slowly with the lights on at night, he can secure brighter lights by using 7- or 8-volt bulbs, but the probabilities are that the life of the lamp will not be as long.

2000 Maximum R.P.M. of 1910 Thomas

Editor THE AUTOMOBILE:—I have a Thomas six-cylinder 1910 model K and would like to know the following:

1—What speed could this car make originally with standard equipment?

2—What is the maximum number of revolutions of this motor?

3—Where can I get repair parts?

Sea Bright, N. J. F. E. G.

—This car can make about 60 m.p.h. when in good condition.

2—The revolutions per minute of the motor at maximum horsepower are about 2000.

3—Repair parts for the Thomas car can be secured from the following: E. R. Thomas Motor Car Co., Buffalo, N. Y.; J. Rosenfield, 521 Sixth St., So. Boston, Mass., and the Automobile Construction Co., 2637 Cottage Grove Ave., Chicago, Ill.

Crankshaft Speed a Variable Quantity

Editor THE AUTOMOBILE:—Do the cylinder type of shock absorbers cause a car to skid when driving over bumpy roads?

2—Do automobile trade directories give addresses of all shock absorber manufacturers?

3—What is the gear ratio of the Overland on reverse and on low?

4—At what crankshaft speed does it deliver its maximum horsepower?

5—What speed should the model 80 Overland make when in good working order?

Bouton, Iowa. C. M.

—They should not do so and as far as is known, do not.

2—They endeavor to do so.

3—14.5 to 1.

4—The exact crankshaft speed will vary in different motors, but it is approximately 1800 r.p.m. for maximum horsepower.

5—44 to 50 m.p.h.

Use of Optical Indicators for Checking Defects in Functioning of Motors

DURING this period when many motors for automobiles, motor trucks and motor boats are being re-designed or replaced by new ones, with a view to incorporating as much of recent progress in efficiency and economy as the manufacturer considers it safe to strive for in practice, or for any other similar purpose, the use of indicator diagrams, for comparing results from the old and from the new designs and for examining motors submitted for examination, is spreading to factories where they have been used very sparingly or not at all before, and ability to do the work of taking and interpreting the diagrams is coming to be one of the requirements not only of engineers but of foremen and other mechanics as well. Amateurs and dealers may soon take up this method, also, as one of the readiest means for examining the condition of a motor that has seen service.

The data of the most recent American development in this respect are not yet at hand, but meanwhile an account of the subject from the German viewpoint—as presented in a number of recent issues of *Auto-Technik*, will be found of practical interest to a large number of persons.

As American, British and French indicators are generally known in the automobile industry, illustration and description of them may here be omitted, and the optical indicator of Otto Schulze's design which is widely used in Germany may be taken as an example to illustrate the general mode of operation with instruments of this order. It differs from the other designs mainly by the peculiar arrangement and bearings of the carrier for the mirror. Fig. 1 shows the arrangement in elevation and plan, diagrammatically. The water-cooled diaphragm 1 is as usual connected with the motor cylinder by a tube and carries the spindle 2 for transmitting the movement from the diaphragm through the springy lever 3 to the mirror holder. This holder is secured by the thin leaf spring *F* to the slide 5 which can turn around the pin 4 projecting from the bedplate. In the slide there is shown a circular hole making room for a turnable eccentric disk 7, but in practice a crank mechanism takes the place of this device. The manner of operating is as follows:

When the rising or decreasing pressure in the motor cylinder raises or releases the diaphragm, the movement taken through pin 2, lever 3 and holder 6 changes the angularity of the mirror toward the light source *L* and the bedplate. This change in angularity is recorded on the ground glass screen as a change of pressure. The horizontal change of the mirror's position with relation to the light source is

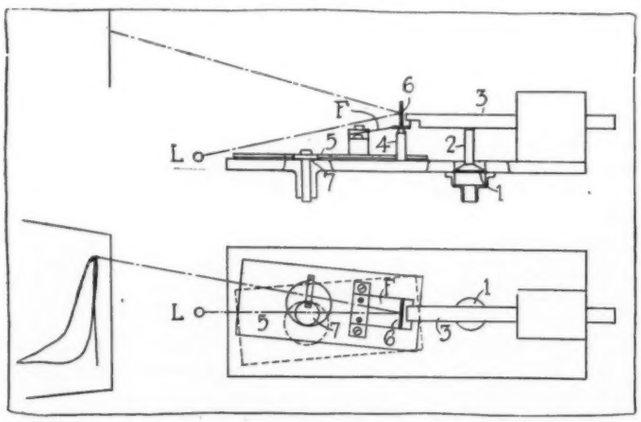


Fig. 1—Elevation and plan of Schulze indicator

effected by the turning of slide 5 around pin 4, the eccentric 7 being connected by a gear with the camshaft of the motor. To obtain a correct diagram, the phases of the movements must correspond; that is, the turning-ratio of the mirror must be brought into a certain relation to that of the motor shaft, and for this purpose there is provided an adjustment for the crank of the indicator between limits of 1 to 4 and 1 to 6, which is usually sufficient. Fig. 2 shows a Schulze indicator for a four-cylinder motor, arranged for producing four similar diagrams for the four cylinders and having them visible in a row for easy comparison.

A, *B*, *C* and *D* are the ground glass screens on which the diagrams are projected under the influence of the shrouded electric bulbs *E*, *F*, *G* and *H*. The apparatus is secured to the motor by means of bracket *L* and is actuated from the motor by shaft *K* which can be correctly adjusted at *M*. Fig. 3 shows the manner of mounting this indicator on a four-cylinder motor. *M* is here the indicator and 1 is the

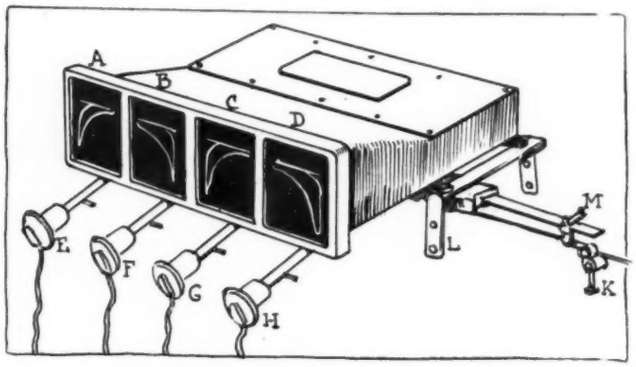


Fig. 2—Arrangement of screens and lights

gear transmission from the motor. The four gas tubes taking pressure from the motor cylinders to the diaphragms are provided with stopcocks 2. Vibrations of the motor have with this mounting no influence on the accuracy of the indicator's work.

These indicators are usually furnished with two sets of diaphragms, one for high pressures to indicate normal operation under power and one for low pressure, with which the functioning of the valves can be studied with the ignition and gas admission cut out. The high-pressure diaphragm for the Schulze indicators produces a scale in the diagrams of 3 millimeters per atmospheric pressure, while the more flexible membrane for diagrams of the compression gives a scale of 10 millimeters per atmosphere.

When a multiple indicator is used, the diagrams simultaneosuly traced for the different cylinders should be alike, and any difference in them points in itself to some error. If the diaphragms are not exactly of equal tension, the differences which will appear in the diagrams easily lead to wrong conclusions. It is therefore recommendable to test them by comparing with diagrams obtained by using the same diaphragm successively for the four cylinders.

The ground-glass screen of an indicator is usually so arranged that it can be conveniently replaced by a photographic plate. In some instances photographic films have also been used instead of plates. The curve of the diagram appears as a continuous luminous line on the dark background of the screen, the effect being that indicated in Fig. 4. A Schulze

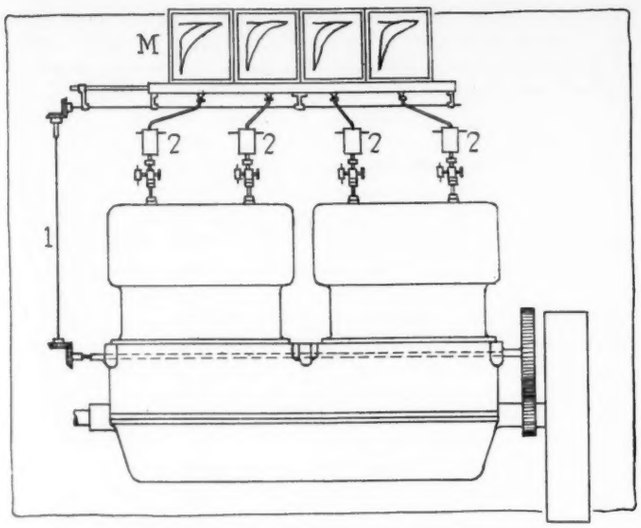


Fig. 3—Mounting of indicator for 4-cylinder motor

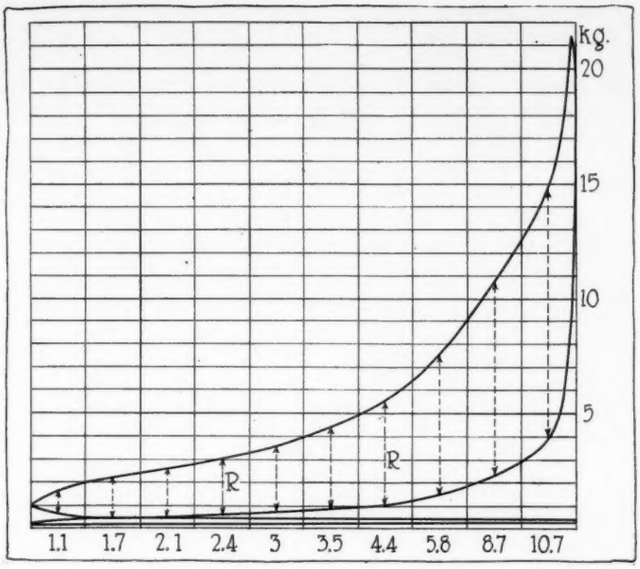


Fig. 5—Method for finding mean effective pressure

diagram, for example, is 70 millimeters long, but, if it is desired to follow the work of the motor more closely than is possible on this scale, a projector lens is employed to throw the diagram on a more distant and larger screen, where its length may be perhaps 500 millimeters. It is especially interesting to observe the lightning changes in the diagrams occurring at the different stages of the motor work so clearly as they appear with this large magnification. With the use of improved light sources the observations can be conveniently made even by broad daylight.

When the diagram is to be permanent a photographic camera is inserted instead of the glass screen, and the plate is taken out and developed in the usual manner. If bromide or other negative paper is used in the camera instead of the plate, the diagram is obtained in black on white by the developing. When no photographic apparatus is used, however, and the motor is operated by its own power the whole curve of the diagram is always visible to the observer, as the retina of the observer's eye easily retains the whole image during the very short period in which it is produced, and all defects in the working cycle of the motor can therefore be at once recognized, whether due to insufficient filling of the cylinders with gas, poor compression, leaks, incorrect functioning of the valves or wrong timing of the ignition, and the proper remedy can thus be devised without long groping or guessing.

[An exception is noted for the case that the motor is cranked slowly by hand to test compression, under which condition the generation of the curve can be followed from point to point but is not seen at any moment in its entirety, on account of the slowness of the movement, and for a test of this kind the photographic method is preferable, even if it is not otherwise necessary to preserve a record of the test.]

Aside from its utility for demonstrating errors in the functioning of a motor, the indicator can be employed to determine its mechanical efficiency. It gives the means for calculating the indicated horsepower, and by deducting from this the power shown by brake test the difference stands for the mechanical losses due to friction. To obtain the indicated power, the diagram is divided by vertical lines in ten equal parts (Fig. 5) and the ordinates R of the diagram are measured in the middle of each part, in millimeters. These figures are converted into pressures in kilograms per square centimeter according to a schedule which accompanies each indicator from its maker. Usually 2 or 3 millimeters represent 1 kilogram per square centimeter. These values are entered and added up at the foot of the diagram, and the sum divided by 10 represents the mean effective pressure. In Fig. 5 this mean is found to be 4.27 kilograms. If the cylinder has, for example, a bore of 120 millimeters and a stroke of 145 millimeters and the motor speed is 950 r.p.m., the indicated horsepower is found from the formula:

$$N_i = \frac{O \times P_i \times n \times l}{60 \times 75}$$

in which O is the piston area (here 113 square centimeters), P_i the mean effective pressure, n the number of explosions per minute (here 950 divided by 2, or 425) and l the stroke in meters (here .145 meter). By inserting these values one has:

$$N_i = \frac{113 \times 4.27 \times 425 \times 0.145}{60 \times 75} = 6.61 \text{ indicated horsepowers.}$$

Frequently, parts of the exhaust, the compression and the suction curves form a loop and in that case include a certain area, but this is usually (as in Fig. 5) so small that it can be neglected. It represents, however, negative work, and, if it is large enough to be considered, it can be figured out from its ordinates in the same manner as the main area, and the mean negative pressure can be deducted from the working pressure to find the value to be used in the formula for indicated horsepower.

After the indicator has been mounted upon the motor the cycle of the indicator movements must first be adjusted to correspond to that of the motor. To this end the motor is turned by hand. During the compression stroke the pressure in the cylinder then rises to nearly that of normal compression, and during the following stroke the pressure

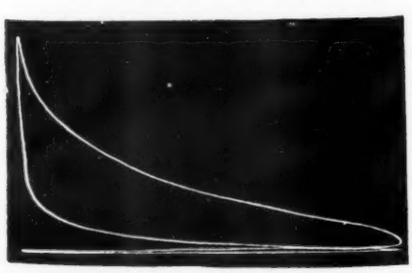


Fig. 4—Diagram as shown on screen

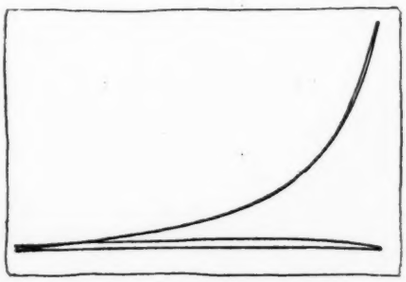
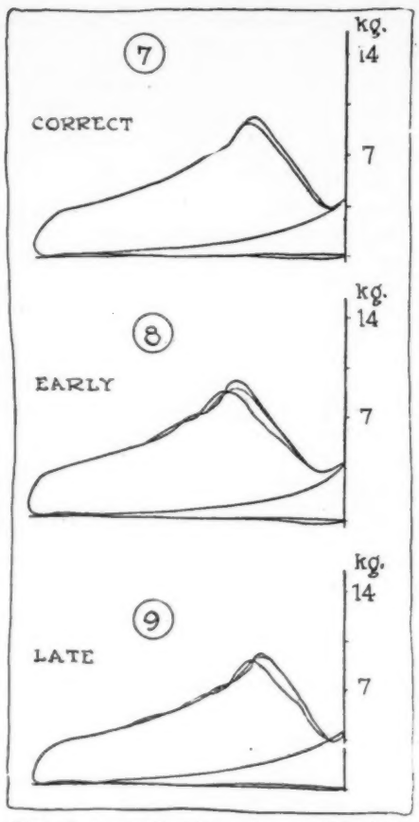


Fig. 6—A compression diagram

is shown to diminish according to the same curve, provided the cycles correspond properly. The total curve is then like that shown in Fig. 6, the compression and expansion curves almost coinciding. The first portion of the expansion curve falls a little below the compression curve, because at that moment heat generated by the compression is taken up in the cylinder walls. If a more marked lack of coincidence in the two lines is shown, the adjustment of the indicator is operated until correspondence is produced.



Figs. 7, 8 and 9—Means for synchronizing indicator and motor

The working diagram can also be used for adjusting the cycle. While the motor is at rest such an adjustment is first made of the indicator's gear or lights that the luminous point is at the end of its course when the piston has reached the end of its stroke. The motor is then started with the spark so late that the charge is not ignited till the dead center is passed. The adjustment for securing synchronic movements is now manipulated until that portion of the diagram which represents the end of the compression stroke and the beginning of the working stroke assumes the shape it has in Fig. 7. If the cycle of the indicator is ahead of that of the motor a diagram like Fig. 8 is obtained, while one like Fig. 9 shows that the indicator cycle is behind. The correct adjustment is of great importance. With a certain motor it was shown, for example, that a fault of 6 deg. in the indicator adjustment gave a mean effective pressure of 7.03 kilograms per square centimeter, while a correct adjustment gave 6.25 kilograms.

When the motor works to best advantage, its indicator diagram should correspond approximately to the ideal diagram which may be construed from the data of the motor. This theoretical diagram is constantly kept in mind when one interprets the meaning of variations in shape of actual diagrams, and it is therefore the basis for making practical use of indicators. It is shown in Fig. 10.

The Ideal Diagram

On the zero line the piston stroke *ac* of the motor is marked as abscissa, and on the vertical axis are measured, as ordinates, the pressures existing in the combustion chamber. The distance from O to *a* represents the compression chamber or dead space in the cylinder. When the piston moves from *a* to *c* in the suction stroke, the pressure above the piston remains in theory atmospheric (under the assumption that the charge follows the piston readily) and the pressure curve becomes the straight line AC which is parallel with the zero or vacuum line. During the compression stroke the piston moves back from *c* to *a*, and the pressure increases at the rate of the adiabatic curve CE (adiabatic = calculated on basis of pressures and volumes only) on the supposition that no heat is transmitted from the cylinder wall to the gas. At point E the compressed charge is now ignited and the pressure rises instantaneously from E to F. At F begins the expansion or work stroke and the piston moves again from *a* to *c*. Again assuming no heat transmission to take place, the expansion curve becomes adiabatic and runs from F to H. The exhaust valve is opened at the end of the work stroke, and the pressure drops suddenly from H to C. By the subsequent exhaust stroke of the piston from *c* to *a* the pressure remains atmospheric and is represented in the straight line CA.

Meaning of Areas

The diagram area ECHF represents the work done by the cylinder. Consequently every motor builder aims to obtain the largest possible diagram area, and Fig. 10 represents the theoretical maximum, which cannot be reached in practice, as the actual conditions in a four-cycle motor deviate considerably from the assumptions under which the ideal diagram is constructed. First, the suction stroke produces more or less depression in the cylinder, so that its curve 1, in Fig. 11, falls below the straight line indicating 1 atmospheric pressure. During the compression the cylinder walls part with a certain amount of heat to the gas mixture, the tension of which is thereby increased, and the compression curve 2 lies for this reason higher than the theoretical curve CE in the later portion of its course. On the other hand, the inflammation of the gas is not instantaneous but requires a little time, and it is therefore necessary to start the ignition before the upper center is reached, for example at *m*, Fig. 11. The straight line EF in Fig. 10 is thus replaced by the curve *m*2 in Fig. 11. During the explosion stroke the gases impart heat to the cylinder wall and their pressure is reduced accordingly, so that the real expansion curve 3 drops considerably below the theoretical

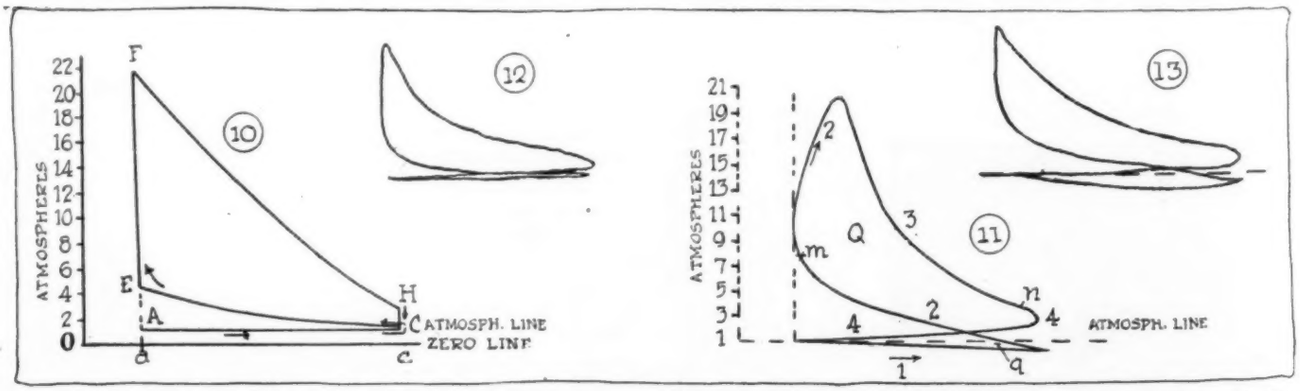
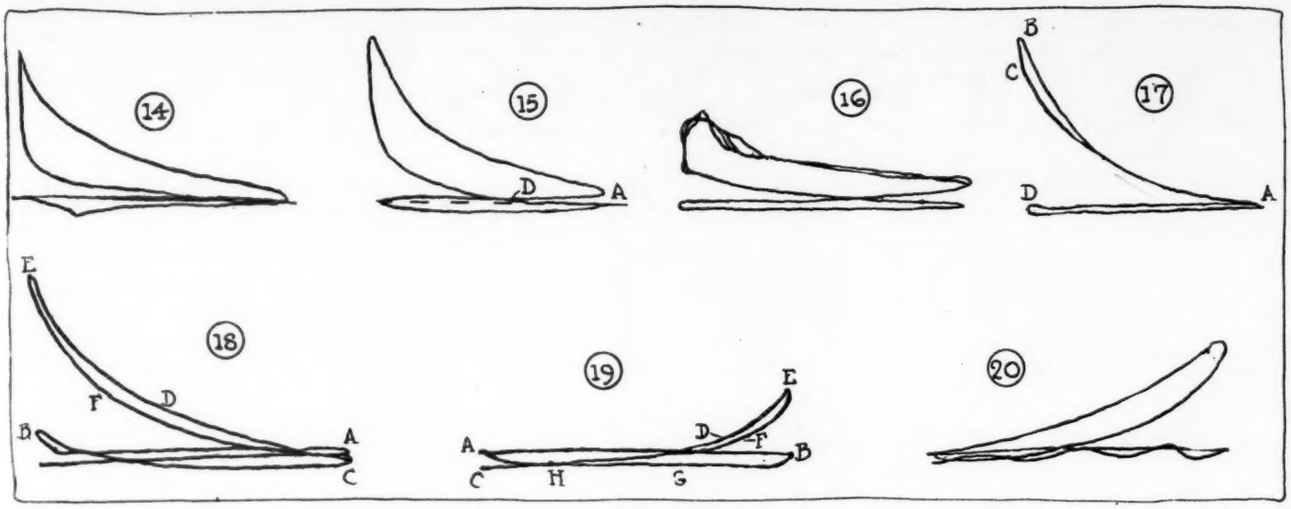


Fig. 10—Ideal diagram. Fig. 11—Type of actual diagram. Fig. 12—Diagram showing motor functioning well. Fig. 13—Diagram showing poor volumetric efficiency



Figs. 14 to 20—Diagrams indicating defects in the intake or in the compression, as explained in text

curve FH. The exhaust valve is also opened before the piston reaches lower center, as at *n*, to avoid back-pressure, and the curve from *n* downward to the right indicates the diminishing pressure. Finally, the pressure of the exhaust gas will be higher than atmospheric during all or nearly all of the exhaust stroke, and the exhaust curve 4 therefore lies higher than the horizontal line of atmospheric pressure.

All these disadvantages are shown with exaggeration in Fig. 11, which however makes it plain that the diagram area Q, from which the lower diagram area *q*, being negative, must be deducted, is considerably smaller than the theoretical diagram area of Fig. 10.

A very good actual diagram is reproduced in Fig. 12. The compression is faultless, ignition and carburetion are good, the valves work properly and back-pressure against the exhaust is reduced to a minimum.

Every disturbance in the functioning of the motor acts at once on the shape of the diagram, and usually a certain deviation from the normal in the curves of a diagram may be correctly ascribed to a certain corresponding defect in the functioning of the motor as its cause.

In the following, causes and effects of this order are explained and illustrated.

Diagrams of Faulty Induction

When the suction curve for its entire length runs considerably below the atmospheric level without showing a definite curvature or break, as in Fig. 13, the intake valve may be of too small diameter or its lift may be insufficient, but it is also possible that the intake channel is too narrow or has been clogged, so as to throttle the whole gas mixture strongly.

If the beginning of the suction stroke shows a rather sharp downward point, as in Fig. 14, the intake valve opens either too late or too slowly, causing a considerable depression in the cylinder before the gas finds the passage open. But when the intake valve closes too slowly or too late, the beginning of the compression curve will coincide with the line of atmospheric pressure, as AD in Fig. 15, and the compression will not really begin till the piston has reached D. It happens frequently at trials of new motors that all of these sharply marked irregularities occur in the same diagram. With the gases so strongly throttled that the cylinder does not receive a full charge, the diagram can take the shape of Fig. 16, where the great reduction of the explosion pressure is conspicuously shown.

To examine the tightness of piston rings and valves it is better to take a compression diagram than a working diagram. It can be obtained either by cutting out the spark and letting the motor run a few turns thereafter or by turning the motor by hand a few turns while it is still warm.

Diagrams of Faulty Compression

Fig. 17 shows a compression diagram of a motor with poor compression. The motor in this case had unmuffled exhaust and was still warm. If all organs had been air-tight, the compression curve AB should have coincided with the expansion curve CA. But as in reality gas escaped at rings or valves or both, the expansion curve CA came notably lower than AB. It is also seen in this diagram that the exhaust curve at D is arched slightly upward, and this was due to too early closing of the exhaust valve, causing some compression at the end of the exhaust stroke. The intake valve, it is also shown here, opens too late, which should be corrected in the valve control.

Fig. 18 shows a very bad compression diagram. The exhaust curve AB has strong back-pressure, and the exhaust valve closes too early, as indicated by the raise at B. The suction curve BC runs far below the atmospheric line, pointing to an undersized intake valve. Finally, the compression is also shown very poor, since the expansion curve EFA falls below the expansion curve CDE.

If the gas mixture is strongly throttled, the compression diagram takes the shape of Fig. 19. BGC is the suction curve, which plainly shows the throttling. CDE is the compression curve and EFH the expansion curve. As the exhaust valve opens as early as at H, the interior pressure in the cylinder is reduced to atmospheric from H to A, and this is maintained during the exhaust stroke AB.

A motor with automatic intake valves gives a diagram in which the suction curve shows a wavy course, as in the compression diagram, Fig. 20. The waves, compared with the steady course of the suction curve for a mechanical inlet valve, indicate plainly the superiority of the latter. Fig. 20 also shows a very inferior compression, the compression and expansion curves being separated.

Diagrams of Faulty Ignition

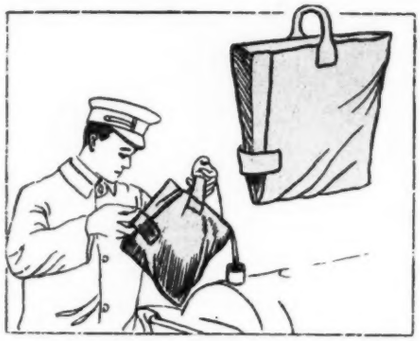
Errors in the timing of the ignition are marked very plainly in indicator diagrams. Fig. 21, *a* to *f*, shows diagrams obtained by different timing. The effect of premature ignition taking place when the piston has finished only three-fourths of the compression stroke is shown in diagram *a*, and *b* shows the effect when there is 20 per cent left of the compression stroke. Both diagrams have the loop which is characteristic of an over-advanced spark.

(To be continued)

ACCESSORIES

Rayntite Folding Water Bucket

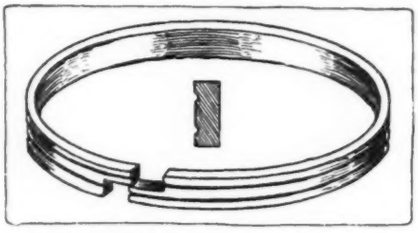
REALIZING the possibilities for a folding water bucket, the Fabrikoid company has brought out a design of waterproof Rayntite which is very compact. Rayntite is the material used by the company in its automobile tops and in the bucket all seams are stitched and cemented with a special adhesive to prevent leaking. It holds 1½ gal. of water and pours easily into the radiator cap. Rayntite does not harden or crack so that the bucket may be folded and put under the rear seat cushion. Price, 75 cents.—Du Pont Fabrikoid Co., Wilmington, Del.



Rayntite folding water bucket and its use

Rittenhouse Piston Ring

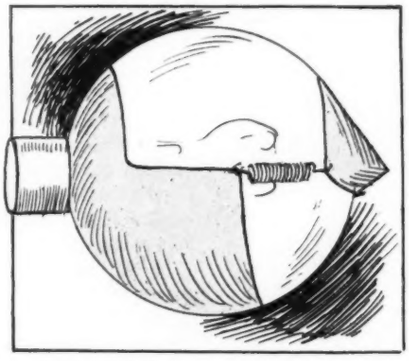
A piston ring designed to eliminate gas leakage has been developed by George R. Rittenhouse and has the feature of having oil rings around the periphery. This provides a film of oil at all times which acts to maintain proper lubrication and to hold the compression tightly. In addition to the V-shaped groove is the step lap joint which eliminates leakage. The illustration shows that this ring differs widely from the ordinary diagonal split type.—Rittenhouse, Fleury Co., Baltimore, Md.



Rittenhouse piston ring with cross section

Stryker Headlight Deflector

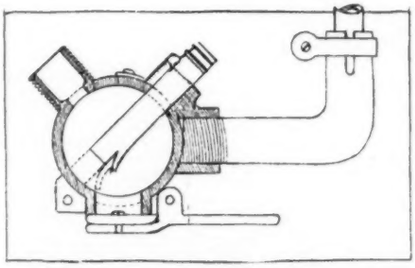
For deflecting the rays of headlights, so as to permit the rays to be thrown on the ground but not to bother pedestrians or approaching cars, the Stryker headlight deflector makes use of a bulb in which the rays of light are brought under control. As shown by the illustration, the bulb is darkened so that the reflector cannot throw the light to a height above the ground sufficient to reach the eyes of the pedestrian. The deflector can be placed on any globe and if one is broken or burned out it can be moved to another, since it is indestructible. The deflector does not dim the rays, it simply deflects them to the place where they are most needed. The price is $1 a pair.—C. L. Stryker, Buffalo, N. Y.



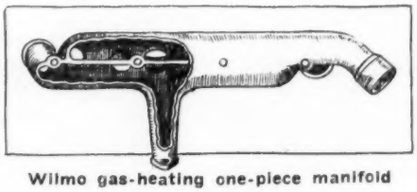
Stryker deflector on headlight bulb

Dietz Carbon Eater

The Dietz system takes water vapor or steam leaving the radiator through the overflow pipe and leads it to the carbureter, where it mixes with the gasoline and air and is carried into the cylinders. An automatic gate in the pipe line between the overflow and the carbureter prevents the passage of liquid which is drained off by a balance trap at the bottom. The makers claim that the device is a preventive of carbon, a softener of old carbon and that it makes the motor run more smoothly on less fuel. It sells for $5, installed.—Dietz Carbon Eater Co., Gray & Thomas, agents, Denver, Col.



Dietz carbon-eater separating valve



Wilmo gas-heating one-piece manifold

Wilmo Manifold

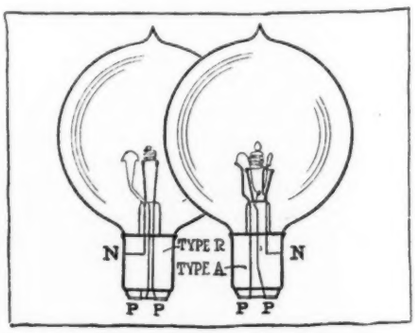
The Wilmo manifold takes both intake and exhaust gases, the two being separated only by partitions. The object is to thoroughly warm the incoming gases and so insure their proper vaporization. Special manifolds are made to fit most of the standard cars on the market and in no case is any machine or other fitting work required, the manifold fitting exactly in the place of the original. Better running and greater fuel economy are claimed for the device. Price, standard model, $10; Ford model, $7.50.—Wilmo Co., Chicago, Ill.

Tulite Headlight Bulb

The object of this bulb is to provide two degrees of illumination within the lamp itself, which is accomplished by using two filaments, either of which can be switched on. The larger filament provides full illumination and the smaller gives sufficient light to see from 40 to 75 ft. ahead of the car. The bulb is made in two types; type R is inserted with the small filament above the larger, projecting the light on the roadway at short range, while type A has the small filament mostly surrounded by the larger so that the diffused light covers a large area. In the standard bulb the candlepowers of the filaments are 4 and 20, but other intensities and combinations can be supplied.—Tulite Auto Bulb Co., Detroit, Mich.

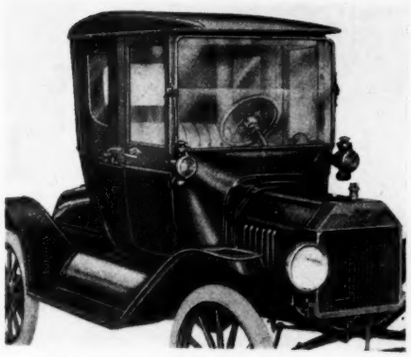
White Coupé Top for Fords

This mohair top makes use of the windshield that comes on the car, but an inner shield is built into the top at the rear of the regular shield. Two bolts secure the door of the demountable top to the car door and a hinge holds it in place at the top. Handles connect with the door lock on both inside and out. The inner shield mentioned and the windows are of heavy celluloid made expressly for the purpose and are fastened to the



Tulite double filament bulbs

frame of the top with turn fasteners. For summer driving the side curtains and inner shield are removed and the back curtain rolled up, if desired. The door may be dismounted or left on as it is light and correctly hinged. If desired, the coupé top may be removed entirely and used only for colder weather. A fabric cowl is furnished for 1913 and 1914 models. The makers state that the top can be put on in a few hours, full directions being supplied. For 1915 or 1916 models the tops sell for $45 while for 1913 or 1914 models the price is $46. —Geo. White Buggy Co., Rock Island, Ill.



White coupé top for Ford cars

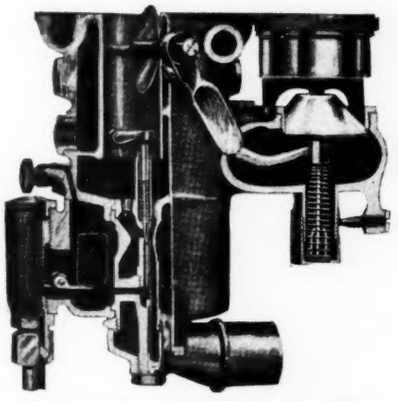
Whetstone Instrument Board

This instrument board is designed for Ford cars and is made of heavy sheet steel, reinforced. It is secured by two bolts, and the makers state that it can be attached in 10 min., the bolts used being already on the car so that no drilling is required. The clock, lamp and switch, furnished with the complete equipment, are finished in nickel. The board is enameled black, and alone sells for $1, while with clock, lamp and switch the price is $4.05.—J. H. Whetstone & Co., Lapeer, Mich.

Whetstone's instrument board for Fords

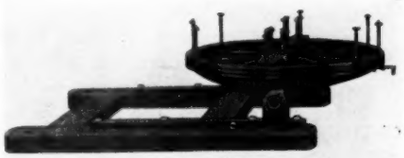
Guco Garage Tire Pump

This new garage pump is a self-contained unit, mounted as shown in the illustration. A handle is supplied, allowing it to be easily carried, or it may be mounted on a small carriage, if desired. The air pump, mounted on the motor, has four cylinders, insuring a steady flow of air, the corrugations on the cylinders assisting in dissipating the heat generated and keeping the operating temperature low. Metal pistons, each with two compression rings, are used, the connecting-rods and main bearings being of bronze. The motor is the ¼-hp. standard Westinghouse type CA or CD, depending upon the nature of the circuit. All electrical contacts are shielded and all working parts inclosed, making it dust-proof.

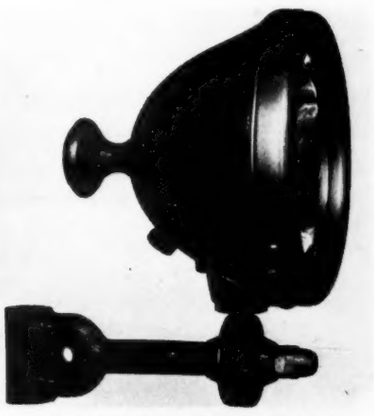


Webber automatic control carbureter

Guco power tire pump for garages



Martin's fifth wheel for trailer



Foster Owl swiveling searchlight

All parts of the pump are lubricated by splash. The complete equipment consists of a motor-driven pump, a pressure gage, an air hose, an acorn connection and a snap switch for starting and stopping the motor.—General Utility Co., Philadelphia, Pa.

Webber Carbureter

Automatic fuel control is vested in the air valve of the Webber carbureter, which is connected to the needle valve in the centrally located spray nozzle through an arm and opens the valve in proportion to the air opening. A dashpot above the air valve prevents fluttering. There are two adjustments in addition to the air-valve spring tension adjustment; one is for low speed and the other for high speed, and these are non-interfering. The richness of the mixture can be regulated by a lever on the steering column without upsetting the proportions at high and low speeds. The carbureter is intended to be used with a hot air supply, and fittings for this purpose are supplied at an extra charge. The instrument sells for 1¼ in., $30; 1½-in., $35; 1¾-in., $40; 2-in., $45.—Webber Mfg. Co., Boston, Mass.

Martin's Fifth Wheel

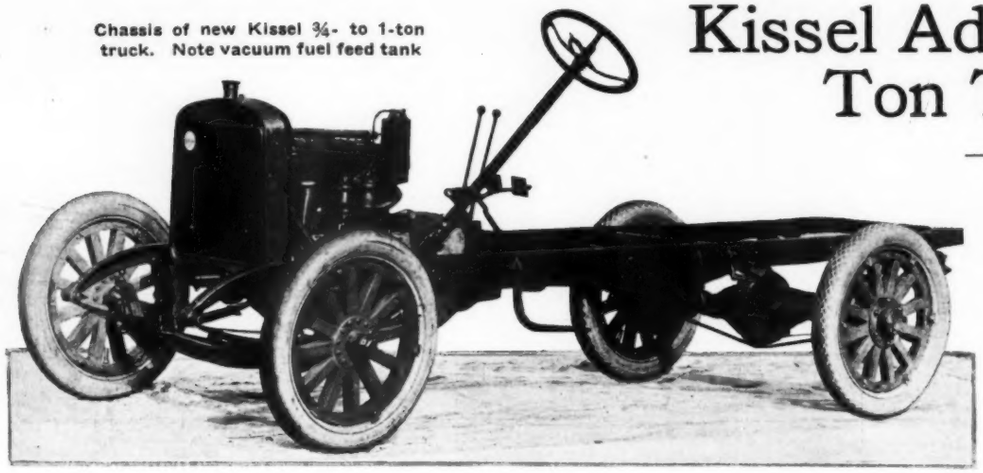
One-half of this fifth wheel is designed to be mounted under the front end of a two-wheeled trailer and the other half on the rear of the frame of the towing vehicle. The lower circle of the fifth wheel is carried on transverse trunnions so that strains due to rough roads are avoided. The springs take care of twisting tendencies. The makers state that a Ford car can handle a 1500-lb. load on a semi-trailer, the trailer wheels being so placed that the weight on the rear wheels of the car is normal and the trailer wheels carry the rest. Price, 18-in., for Fords and other light cars, $25; 32-in. for 1 to 3-ton trucks, $80, and 36-in. for 4 to 5-ton trucks, $90.—C. H. Martin, Springfield, Mass.

Foster Owl Searchlight

The Owl searchlight is provided with a swivel which permits it to turn in any direction, and which is of such size and design that it is unaffected by jolting and vibration, although easily moved by the hand. The bracket may be easily attached to any windshield without other fittings. The lamp is furnished with tungsten bulb, bracket, 3 ft. of cord and two sockets for $7.50.—C. H. Foster Accessories Co., Chicago, Ill.

Shelby Garage Door Holder

This device catches the garage door when it has swung open and holds it until released by a pull on the ring at the end of the chain. It is of wrought steel and no springs are used. Finish is black japan. Price, $1.50.—Shelby Spring Hinge Co., Shelby, Ohio.



Chassis of new Kissel ¾- to 1-ton truck. Note vacuum fuel feed tank

Kissel Adds ¾- to 1-Ton Truck

New Worm-Drive Model To Sell for $1,250—Rear Axle a Feature

A NEW departure for the Kissel Motor Car Co., Hartford, Wis., is in the shape of a new ¾- to 1-ton worm-drive truck which is to sell for $1,250. The details of the new design have just been announced and the factory has already started on quantity production and is ready for immediate delivery.

The feature of the new design is the David-Brown rear axle which has a 56-in. track and 39-in. spring centers. The worm wheel and differential are mounted as a single unit in a cast-steel carrier placed in the center housing of the axle. With this construction the weight of the truck is carried on heavy steel tubes and in the lower part of the axle housing is a spacious oil reservoir. An automatic oil level and filler plug is fitted to secure constant lubrication. One of the meritorious features of the axle is that it can be taken apart and reassembled without removing it from beneath the truck.

32-Hp. Power Plant

A Kissel power plant which is rated at 32 hp. and is built in the form of a four-cylinder motor of 3⅞ by 5½ dimensions is employed. This motor is featured by large bearing spaces to take care of heavy duty jobs and the crankshaft bearings are of white metal, steel-backed and babbitt-lined. Special gage steel is used for the valves and the entire valve action is inclosed by quickly removable covers.

An integral forging is used for the camshaft. The bearing spaces on this also are generous and the construction is so arranged that the entire shaft can be removed without disturbing the bushings. A further move towards accessibility has been made by building the crankcase in halves. The lower section can be removed without disturbing any other part. The crankshaft is supported in the upper half of the crankcase and is an extra heavy drop forging.

Lubrication is by a constant level splash system with a positively driven pump forcing the oil through tubes to the splash troughs. The oil is strained before entering the pump.

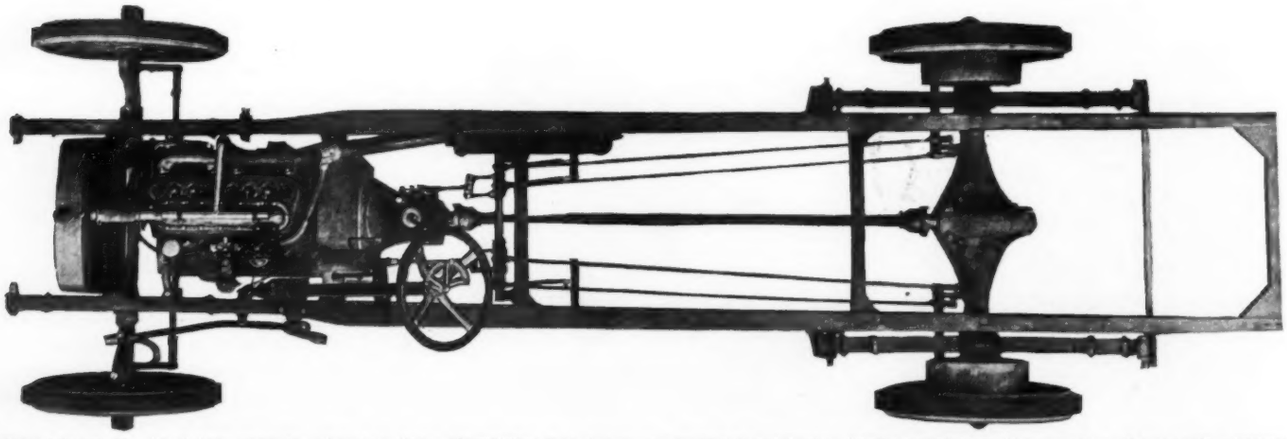
Carburetion is by a specially made Stromberg instrument of Kissel design. Owing to the use of vacuum feed accessibility is secured by mounting the carbureter quite high.

A cone clutch with leather facing and adjustable spring inserts transmits the drive. Accessibility here is secured by rendering the parts all open for inspection through the floor of the truck. The clutch and gearset are in unit with the motor and the whole plant is suspended at three points.

Simplicity in the layout of the chassis is secured by reducing to the minimum the number of operating levers. Both the foot and emergency brakes are internal expanding and both are equalized. The gearset is connected with the rear axle through a grease-packed Spicer Universal joint and driveshaft. The differential is a bevel gear design.

A feature of the truck is that the speeds are automatically governed. Twenty m.p.h. can be obtained on third or direct, 10 on second and 5 on first. The truck has a turning radius of 25 ft. which is short for its wheelbase of 125 in. The tires are optional, being either 35 by 4½ pneumatic or 34 by 3 front and 34 by 4 rear, solid. The wheels are second growth hickory and made to conform with S. A. E. specifications.

The standard express body is furnished for $150 additional. The company will also supply blueprints if a purchaser desires having the body built by local body builders.



New Kissel ¾- to 1-ton chassis, showing how simplicity has been promoted by reducing to the minimum the number of operating levers

The Automobile

PUBLISHED WEEKLY
Copyright 1915 by The Class Journal Co.

Vol. XXXIII Thursday, November 25, 1915 No 22

THE CLASS JOURNAL COMPANY
Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, Secretary
T. B. Van Alstyne, Advertising Manager
231-241 West 39th Street, New York City

EDITORIAL
David Beecroft, Directing Editor
Donald McLeod Lay A. Ludlow Clayden
J. Edward Schipper Sydney Oxberry
L. V. Spencer, Special Representative, Detroit

BRANCH OFFICES
Chicago—910 South Michigan Ave., Phone Harrison 7707
Detroit—95 Fort Street, West, Phone Main 1351
Cleveland—516-517 Swetland Bldg., Phone Prospect 167

Cable Address ---------- Autoland, New York
Long Distance Telephone ---------- 2046 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico ----------One Year, $3.00
Canada ----------One Year 5.00
Foreign Countries ----------One Year 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft. Post-Office or Express Money Order or Register your letter.

The payment of subscriptions will be shown by stamping the date of expiration—the month and year—on the wrapper that carries your paper each week. No other acknowledgment necessary.

Entered at New York N. Y., as second-class matter.
Member of the Audit Bureau of Circulations.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October 1903, and the Automobile Magazine (monthly), July, 1907.

Tire Standardization

THE automobile tire industry is already profiting from the efforts of standardization but, while a little has been accomplished, very much yet remains to be done. Standardization has in mind at all times the elimination of waste and with some tire makers producing considerably more than 100 different models or sizes of tires, the amount of waste is considerable. This waste is the more useless when it may be possible to standardize on nine different sizes, with their oversizes. But unfortunately the entire field is divided into two grand divisions on the type of tire manufactured, whether clincher or straight-side, and were it possible to standardize on either one it would cut the number of sizes carried approximately in half. The economy in manufacture alone would be large, but there would also be the great economy of simplifying the amount of stock carried in the hundreds of cities and towns throughout the country. Instead of fighting each other on this question of clincher or straight-side, it would be better for tire maker, for tire seller, for car maker and car owner, if the tire industry would get together and definitely settle on one form of construction or the other, a condition which will eventually arrive.

There are many other problems to be settled sooner or later in the tire industry. In the solid tire field is the problem of the height of section which is at present being pushed by a few companies. Then, too, is the relative question of the pressed-on and the demountable solids. Many factors enter into both of these questions which could be simplified by the tire makers getting together with the spirit of determination to settle questions in conference rather than endeavoring to settle them by arguments disseminated by salesmen. Much has already been done to simplify the solid tire field. It was not long ago when if you changed from one make of solid tire to another you changed the wheels on your vehicle. Those days are already happily forgotten, and many of the bothersome questions of to-day can be solved with amazing speed by a business get-together; not a get-together having in mind obtaining some inside information on the other fellow, but a business get-together. This has been proved many times in other fields and there is no reason why there should be any difference in this case.

Car Comforts

THE comfort of equipment has certainly a great deal to do with the sale of an automobile, and it is sure that in the coming shows the accessory stands will display yet another crop of fittings designed to provide the greatest luxury for the occupants of the car. It has been a rule of the past that the accessory inventor should develop his ideas, that the accessory manufacturer should put them on the market, and that the automobile manufacturer should, finally, after a few years, apply them to his standard car.

We have seen this happen with the speedometer, the self-starter and electric lighting. It is in the transition stage with the demountable top that will make a true closed car from an open one and there are sundry other attachments which may come to be standard also. One such is some apparatus for warming the interior of a car, whether of the closed or open variety. We have several methods for applying the waste heat of the exhaust gas to the tonneau or the driver's compartment and with a very little more development as independent accessories there should be a place for them in standard equipment.

Another detail which is likely to be slower in coming, but may none the less be expected eventually, is the tonneau windshield, for as an aid to comfort it only needs to be tried once to be ever afterward desired. As an attachment it is possible to make it fold away with fair neatness, but as standard equipment it could be as inconspicuous as folding seats have now become.

That equipment plays a conspicuous part in selling a car is accepted as a fact, and this has stimulated the invention of thoroughly good fittings which will really be appreciated by the motorist. Probably the shows just coming will excell all others for the display of intelligent accessories of this class, and show visitors should make sure they pay proper attention to the accessory section.

Buick to Double Plant

150,000 Cars for 1917—To Enlarge All Parts and Accessory Plants

DETROIT, MICH., Nov. 23—*Special Telegram*—The plant of the Buick Motor Co., Flint, Mich., is to be doubled and for 1917 a production of 150,000 Buick cars is contemplated, or double the production scheduled for 1916. A new motor castings foundry two stories, 470 by 247 ft., with basement, will be put up at once. Additions to the drop forge plant 40 by 200 ft. are under way and further additions will be put up. Half a million dollars will be spent for this purpose and the working force will be gradually increased but this will not be done as rapidly as desired because several thousand new houses will have to be erected in Flint to house the men.

All other plants making parts and accessories for the Buick and General Motors companies will also be enlarged to increase their output facilities. When the new motor castings foundry is completed the old Michigan Motor Castings plant will become a part of the plant of the Weston-Mott Co. Three hundred Buick cars are now being built daily.

—

Crane with Lockhart in Europe

NEW YORK CITY, Nov. 23—H. M. Crane, chief engineer and vice-president of the Simplex Automobile Co., New Brunswick, N. J., has accompanied Henry Lockhart, president of the Simplex company and the Wright Aeroplane Co., on his trip abroad to study the recent developments made in aeroplane motors in England and France. Both Mr. Crane and R. B. Wasson, factory manager of the Simplex company, have joined the Wright company.

—

Work Off for Europe

NEW YORK CITY, Nov. 23—B. G. Work, president of the B. F. Goodrich Co., sailed yesterday for Europe on the Philadelphia. The trip is made in the interests of the French subsidiary of the Goodrich company.

—

Bell Delivery Car $750

YORK, PA., Nov. 19—Shipments of Bell commercial cars are being made from the plant of the Bell Motor Car Co., this city. The car is of the light delivery type capable of carrying 1200 lb. and is made with open and closed body, being mounted on the same chassis as the touring car. It is equipped with a Bosch magneto instead of the battery coil system, as used on the touring car. It has electric lights and starter, Lycoming 3½ by 5-in. motor; 112-in. wheelbase and uses Hotchkiss drive. Orders for quite a number of the cars have already been booked by the Bell company. Its price is the same as that of the touring car and roadster manufactured by the company, $750.

The work on the erection of the two large additions at the plant is about being completed. Operations in the several departments are being gradually increased and the output now averages two cars daily.

—

1916 Pullman on One Chassis

YORK, PA., Nov. 22—The Pullman Motor Car Co. will produce but one chassis for 1916 with 114 in. wheelbase, cantilever rear springs and equipped with 31 by 4-in. tires, non-skid all around on demountable rims. The motor is 3¾ by 4¼, block cast, and a unit with a multiple disk clutch and three-speed gearset. Four bodies are mounted on this chassis, these being five-passenger touring, two- and three-passenger roadsters and a coupé which is equipped with the C-H magnetic gearshift. The price of this model is $990; the others list at $740. Among the changes that have been made are the adoption of independent ignition by Dixie magneto and cantilever springs.

—

U. S. Rubber Co. to Open Lycoming Plant

WILLIAMSPORT, PA., Nov. 19—The United States Rubber Co. will shortly reopen the plant of the Lycoming Rubber Co., this city. Minor repairs are being made to the plant which will be ready for operation before Jan. 1. It is understood that the company intends to use the Williamsport plant as an "overflow" factory, that is to manufacture on a small scale certain lines which the plants of the company already in operation are not equipped to make or too busy to turn out.

—

Kenney With Hyatt Bearing

NEWARK, N. J., Nov. 19—W. C. Kenney has joined the Hyatt Roller Bearing Co. as chief mechanical inspector. Mr. Kenney comes to the Hyatt company from the Northway Motor & Mfg. Co., Detroit, Mich., where he was division superintendent. Previous to his engagement with that company he was factory superintendent of the King Motor Car Co.

—

Hood Resigns from Detroiter

DETROIT, MICH., Nov. 20—Wallace C. Hood, who has been general sales manager of the Detroiter Motor Car Co., has resigned. He was formerly sales manager of the old Briggs-Detroiter Co. Mr. Hood intends to enter another line of business.

Saxon Motor Car Corp. Now

Succeeds Co.; Capital $6,000,000 —To Increase Production —Dealers Buy Stock

DETROIT, MICH., Nov. 20—Another big event in the automobile industry of this city took place to-day. It was the announcement by President Harry W. Ford of the Saxon Motor Co., that the latter concern has been succeeded by the Saxon Motor Car Corp., which has just been incorporated under the laws of New York, and whose capital stock is $6,000,000.

The Saxon Motor Co., which started in business in November, 1913, was capitalized at $350,000 of which $250,000 was common stock and $100,000 was 7 per cent preferred stock. The entire new capital stock is common, and half of this, or $3,000,000 will be offered to the public at $75 per share, a first payment of $5 per share being required with all subscriptions. The subscription books open Monday, Nov. 22, and close Nov. 24.

Dealers Buy Stock

These $3,000,000 worth of stock were bought by a banking syndicate consisting of Merrill, Lynch & Co., of New York and Detroit. They report that Saxon dealers all over the country are buying the new issue.

"Our business has been expanding so rapidly," said president Harry W. Ford, "that we had to make it possible to greatly increase our production and prepare for the future big business, which we anticipate. We have built and shipped 17,000 cars in round figures thus far this year. Our production schedule from the end of August, 1915, to July, 1916, calls for 27,600 Saxon cars. With the increased capital we contemplate greatly increasing our production facilities and the output.

"In October we made and shipped in round figures 2500 Saxons. The November schedule calls for 2800 and in December we expect to turn out and sell 3000. The demand all over the country for our product is growing and I have no fear that the demand for automobiles in general, the lower priced cars in particular, will continue to increase. More and more is the automobile bought as a necessity rather than a matter of pleasure. That is why I believe the automobile business will continue to grow."

The officers of the Saxon Motor Car Corp. and the directors are: Harry W. Ford, president and general manager; Percy Owen, vice-president; Lincoln Scafe, secretary-treasurer. Lee Counselman and George W. Dunham, together with the officers, make up the board of directors.

Springfield Body Co. Formed

$1,000,000 Company to Operate Plant in Detroit as Well as in Springfield

SPRINGFIELD, MASS., Nov. 20—The Springfield Body Co. has been incorporated for $1,000,000 in this city to take over the business of the Springfield Metal Body Co. This reincorporation has been made necessary on account of increased business which has shown a gain of 3000 per cent in the last 120 days.

Plans are now under way for a plant in Detroit which will be used for large orders, while the Springfield plant will be used for small orders.

Hinsdale Smith of Holyoke and A. P. Smith of Granby, the owners of the old company, are included in the list of incorporators with W. L. Fry of New York, E. W. McGookin of Detroit and F. W. Fuller of Springfield.

W. L. Fry has been elected president of the company; Hinsdale Smith, vice-president and chief engineer; E. W. McGookin, vice-president and director of sales; and A. P. Smith, treasurer. Mr. Fry became interested in the company about a year ago and was instrumental in the organization of the new company.

Both Hinsdale and A. P. Smith have been in the automobile business for some years. The Springfield Metal Body Co. was incorporated with a capital of $20,000 in 1905, occupying the old Boston & Albany shops until it moved to Brightwood, where the company owns and occupies three large buildings.

The new stock is divided into $250,000 preferred and $750,000 common. This will probably not be placed before the public, but taken by the trade.

—

A New Motor Company

CANTON, OHIO, Nov. 19—The Ohio Motor Co., a new concern backed by Canton, Springfield and Toledo capitalists, has decided to locate a factory for the manufacture of motor devices and accessories in this city. A site will be secured and a factory 60 by 600 ft. will be erected. One of the specialties to be manufactured is motors for motor trucks, tractors, and aeroplanes.

Steps have been taken to incorporate the concern with an authorized capital of $500,000 of which $200,000 will be paid in.

—

Landis Buys Flinchbaugh Mfg. Co.

WAYNESBORO, PA., Nov. 19—The Landis Tool Co., Waynesboro, Pa., this week purchased at private sale the plant of the Flinchbaugh Mfg. Co. of Greencastle. The price paid was $42,500. The Flinchbaugh company, which was engaged in the manufacture of gasoline engines and tractors, moved from York to Greencastle two years ago and was financed by citizens of Greencastle and vicinity.

The Landis Tool Co., employing 800 persons, manufactures the Landis shock diffuser and other automobile accessories. The company has been rushed with work for the past two years. Last Saturday the employees were given an increase of 1 cent an hour.

—

Hupp Buys American Gear Plant for Axle Plant

DETROIT, MICH., Nov. 22—A deal involving $1,000,000 was completed to-day whereby the Hupp Motor Car Co. acquires the plant and property of the American Gear Co., Jackson, Mich. This is part of the expansion movement started by the Hupp company in conjunction with the recent increase of its working capital.

The Jackson plant has been taken over by the Hupp company and will be known as its axle plant. Dubois Young, who was factory manager of the American Gear Co., will continue with the Hupp organization in the capacity of general works manager. The plant has been employing several hundred men.

Further announcements will be made by the Hupp company concerning further expansion as soon as the details are completed. Plans are being made for a greatly increased production.

—

Reisinger Argo Purchasing Agent

INDIANAPOLIS, IND., Nov. 20—N. B. Reisinger, who has been purchasing agent for the Pathfinder Co., this city, has resigned and accepted a similar position with the Argo Motor Co., Jackson, Mich. Mr. Reisinger was for many years connected with the old Stoddard-Dayton Co., before joining the Pathfinder Co.

—

Brockway Truck Adds to Plant

CORTLAND, N. Y., Nov. 18—The Brockway Motor Truck Co., this city, has purchased nearly an acre of land east of its present plant and has begun work on the foundations of a new building 186 ft. long and 40 ft. wide. The second building will be added in the spring. The buildings are of concrete block.

—

Heads Los Angeles Speedway

LOS ANGELES, CAL., Nov. 20—W. M. Garland has been elected president of the Los Angeles Speedway Association, which is capitalized at $1,000,000. Construction on the 2-mile board track in this city has been started.

Hupp Capital Now $6,500,000

Increased from $1,000,000—$5,000,000 Is Common and $1,500,000 Preferred

DETROIT, MICH., Nov. 19—The Hupp Motor Car Co. has increased its capital stock from $1,000,000 to $6,500,000. Negotiations to that effect had been under way for some time and the re-financing deal was made with the New York bankers Ladenburg, Thalman & Co., and with A. G. Becker & Co., Chicago bankers.

Of the new capital $5,000,000 is common stock and $1,500,000 preferred. Previous to the increased capitalization the entire capital stock of the company was common stock. It is stated, but not confirmed by officials of the Hupp company, that present common stock shareholders will receive a common stock dividend, but no cash dividend. There is also to be a distribution of common stock as bonus to go with preferred stock, but in what proportion this will be, has not been stated.

The Hupp Motor Car Co., was organized in the Spring of 1908, its capital stock being $25,000, and it leased a plant on Bellevue Avenue. Ever since, the business has grown, necessitating the gradual increase of the capital stock while a larger plant was put up first on Jefferson and Concord Avenues and later at Mt. Elliott and Milwaukee Avenues, the present location.

Additions were started some time ago to further enlarge the plant as the production facilities are still inadequate. For the season 1916, the company had planned an output of 15,000 cars, but, according to President J. Walter Drake, this is to be increased.

—

Crow Gets Big Export Order

ELKHART, IND., Nov. 20—The Crow Motor Car Co., this city, is preparing to turn out a new roadster called the Crow-Elkhart Clover Leaf Roadster. Five hundred of the cars have been ordered by a distributing agency in London. The car is built on a low model with three seats in the shape of a clover leaf. It sells for $785.

—

Chevrolet Assembly Plant for Dallas

DALLAS, TEX., Nov. 19—It was learned authentically in Dallas to-day that the Chevrolet Motor Co. will build in Dallas an assembling plant similar to the Ford assembling plant. It is said $250,000 will be spent on the Dallas plant and that several hundred men will be employed. A site in East Dallas has been secured.

Autocar Doubles Capital

Now $2,000,000—Sales Increase 70 Per Cent in Last Ten Months

PHILADELPHIA, PA., Nov. 20—The Autocar Co., Ardmore, Pa., has increased its capital stock from $1,000,000 to $2,000,000 to provide for doubling its manufacturing facilities and output of trucks and to provide for its rapidly expanding business. According to a statement issued by the company, sales have increased 70 per cent during the past ten months over the corresponding period a year ago, this being entirely due to the growing domestic demand, the company having no war orders. The new stock, which, like the original capital, is all common, is being closely held by the original founders and their associates. There are over 3000 owners of Autocar trucks at the present time.

—

Four Gary Trucks ¾ to 2 Tons

GARY, IND., Nov. 20—Gary motor trucks, made by the Gary Motor Truck Co., this city, are produced in four models of ¾, 1, 1½ and 2 tons capacity, all of practically identical build excepting in size of main parts. They are of standard form throughout, employing Buda unit power plants and worm drive, with European motor location and left steer and control. Their general construction is:

Capacity	¾-ton	1-ton	1½-ton	2-ton
Price	...	...	...	...
Wheelbase	118	128	135	144*
Tires, front	36x3	36x3½	36x3½	36x4
Tires, rear	36x3½	36x4	36x5	36x6
Drive	worm	worm	worm	worm
Bore	3½	3¾	3¾	4¼
Stroke	5⅛	5⅛	5½	5½
S.A.E. hp.	19.61	22.5	22.5	29
Speed, m.p.h.	15	15	15	15

*135 optional.

Eisemann high-tension single ignition, with fixed spark is employed and a Stromberg carbureter. All motors are furnished with governors.

Sheldon Worm Axles

Dry disk clutches, faced with Raybestos take the drive from the motor to the three-speed selective gearset amidships, on each model, from which the drive is taken by single shafts with two universals each to the Sheldon worm-driven rear axles.

Goodyear S. V. solid tires are standard, although pneumatics will be fitted if ordered.

—

10,886 on Packard Payroll

DETROIT, MICH., Nov. 19—A few days ago the payroll of the Packard Motor Car Co., showed that 10,886 men were working at the plant. Less than three months ago the number was 8200, while on Aug. 21, 1914, when representatives of the Department of Labor of Michigan, visited the factory, there were 4387 men and women in the employ of the company. This is mentioned to show how the Packard business has been growing and has made it necessary to increase its working force more than 50 per cent within one year. This increase in the number of men employed is expected to continue as the payroll for November is scheduled to be more than $800,000 while in October it totaled $773,879.

During October 477 carloads of material and 3,273,560 lb. in less than carload lots were received at the plant.

—

Employers in New National Body

NEW YORK CITY, Nov. 18—The nineteenth annual convention of the National Founders' Association, opened to-day in this city at the Hotel Astor. While the session was executive, the speakers unanimously agreed that the time had come when the industrial interests of the United States should join in a common movement to insure a successful foundation by acquainting legislators and the people at large, through one organization, as to their legitimate needs. The plan upon which it is proposed to organize the employing and manufacturing forces of the country into one central organization has not been disclosed in detail, but is said that it contemplates the combination of the employers of labor in the industrial plants throughout the United States with special committees selected from all to take up and deal with one particular object such as foreign trade, the tariff, wages, etc.

—

Pontiac Car Builders Prosper

PONTIAC, MICH., Nov. 18—According to reports from four local banks, their total commercial deposits on Nov. 10, showed a gain of $313,681.45 over the total on Oct. 31, 1914. The total saving accounts showed a gain of $285,460.46 for the same period. The total deposits in these four banks were $5,743,922.64 Nov. 10, as compared with $5,144,780.83 at the end of October, 1914. According to officials of the banks, this increase in bank business is due principally to the bigger business of the local automobile and parts manufacturing concerns.

—

Detroit Cos. Increase Capital

DETROIT, MICH., Nov. 19—The capital stock of the Columbia Castings Co. has been increased from $30,000 to $100,000; that of the Christie-Kline Forge Co., from $3,000 to $10,000 and the capital stock of the O. K. Motor Truck Co., from $10,000 to $25,000. The latter company's name has been changed to that of Lincoln Motor Truck Co.

Materials Still Scarce

Tungsten, at Present Unobtainable, Raises Cost of High-Speed Steel

DETROIT, MICH., Nov. 20—The scarcity of materials, either raw or finished, needed by automobile and motor car parts manufacturers, does not seem to be improving, although in some quarters it is claimed that the situation is now better than what it was a month or two ago. As a matter of fact, it does not seem possible and likely that this condition will improve as long as so much war material is being made in the country for the nations at war. As one local purchasing agent said, there would hardly be any scarcity of any material if no motor trucks would be exported and as the exports of trucks alone is nearly ten times in number what the exports were a year ago, there may be some truth in the remark.

A man who is familiar with the situation and who, on account of the big business his firm does, might be called on to speak with authority, is W. H. H. Hutton, Jr., director of purchases at the Timken-Detroit Axle Co. Speaking on the subject generally and of high-speed steels in particular, Mr. Hutton said:

Every piece of high-speed steel used in the making of drills and other tools to cut iron and steel contains about 20 per cent tungsten, and as tungsten is a German and an Austrian product, and therefore unobtainable at the present time, high-speed steel is becoming more costly every day. This scarcity of this metal is really alarming when judged from the motor car manufacturing viewpoint.

"For instance, at the present time if we went on the open market we would have to pay over five times more per liter for high grade steel than we did at the beginning of the war. And the grade of steel would be far inferior to any we ever bought before, in fact it would hardly compare to the very poorest grades offered for sale in this country under normal conditions. Not only are we now paying much more for what we are getting, but we are having a very hard time to get any at all.

"Take drills made of this steel, for instance. To-day we are paying about four times the normal price for ½-in. drills and about five times the normal price for inch drills. Not only are the supply houses quoting these steels at the list price, minus discounts formerly offered, but they ask a high premium over and above the present list.

"This condition does not apply to high grade steels solely, though. Other elements that are extensively used in the

manufacture of motor cars and motor car parts are equally if not more scarce. Antimony has jumped six times its normal value. Aluminum has raised 300 per cent while there is a decidedly rising market on copper, tin and spelter, commonly known as zinc.

"The tin market, however, will soon be in much better shape than it is at the present time. Big ore men in this country have recently opened large furnaces in the east to smelt Ecuadorian tin and this will relieve the tense situation on that product if it does not bring it back to normal.

"There is a little antimony being mined now in Death Valley, Southern California, but the price of labor and bringing it out of the railroads is so high that it has not had much effect on the price of the refined article as yet.

"Should the war continue much longer, American manufacturers must find some way of procuring these essential elements, or manufacturing efficiency will be greatly handicapped. We must have these elements. Now is a good time to start producing them commercially in this country."

—

Sun Moves to Elkhart

SOUTH BEND, IND., Nov. 22—The deal has just been consummated by which the Sun Motor Car Co., Buffalo, N. Y., purchased the two factory buildings formerly occupied by the Sterling Motor Car Co., Elkhart, Ind. The consideration was $30,000. The Sun company will begin the installation of machinery at once. The new company which was incorporated at Buffalo last July, will manufacture the Sun light six to sell under $1,000. The officers of the company are: R. Crawford, president and general manager; J. P. Black, secretary and treasurer; M. H. Pittman, director; Roscoe C. Hoffman, chief engineer; S. A. Merinbaum, sales manager; H. A. Minturn, advertising manager; John L. Larkin, assistant to general manager. All of these men are residents of Buffalo, with the exception of Mr. Black and Mr. Pittman, who are residents of Chicago and Mr. Hoffman, who is a resident of Argos, Ind. It is the intention of most of the officers and heads of departments to move to Elkhart. The first machinery has been ordered for delivery Dec. 15, and it is expected to have the machinery installed soon after that time to begin operations. Two to four hundred men will be employed.

—

Nash as Guest of Honor

FLINT, MICH., Nov. 20—Charles W. Nash, president of the Buick Motor Co. and of the General Motors Co., has been invited as the guest of honor of the semi-monthly dinner of the Board of Commerce of Flint, to be given Nov. 23.

Weight Is Subject of N. Y. S. A. E.

—

Gasoline Electric Committee Reports Progress—Analysis of Types—50 at Session

NEW YORK CITY, Nov. 19—At the meeting of the Metropolitan Section of the Society of Automobile Engineers held at the Automobile Club of America last night a report of the gasoline-electric research committee and a paper on Car Weight in Relation to Acceleration were read. The report of the committee was given by each of the members individually covering different sections of the work. David Beecroft, chairman, gave a summary of the activities of the committee, L. G. Nilson, president Nilson-Miller Co., gave an analysis of the different types examined and a description of the Thomas system and W. P. Kennedy described the wiring and circuits under different conditions in the Owen Magnetic car. The paper on acceleration consisted of miscellaneous notes made by A. Ludlow Clayden based on observations on the acceleration of three typical cars.

The Thomas System

The description of the Thomas system which is in extensive use in England was secured on the occasion of the recent visit of Hedley T. Thomson, one of the managing directors of the company, to this city. This drive, which employs two electrical machines with a planetary gearset interconnecting them, is being successfully used in Europe for heavy units. On railway cars having to climb grades of 2½ per cent with maximum load at 10 m.p.h. these systems have proven to be a success.

As the speed of the vehicle increases the speed of the first electrical machine increases while the speed of the second machine decreases until at half speed, the speed of the second machine which has been in a negative direction reaches zero and then after this time increases in positive speed until finally at maximum vehicle speed both electrical machines are running at engine speed. At maximum vehicle speed, since the two electrical machines are running at equal speed with the motor, the whole system can be connected by means of a jaw clutch, giving solid drive throughout.

Another electrical system known as the Autolectric has been discovered by the committee in addition to the previous classifications and a new sub-division will have to be made for it.

Autolectric—A New System

The distinctive feature about this system is that at starting it is purely an electrical transmission while after a certain vehicle speed has been reached it automatically becomes electro-mechanical. The battery is at all times available for starting the engine or running the vehicle without the engine and it can be charged from the dynamo with the vehicle stationary. The motor also automatically becomes a generator and can be used for braking when the vehicle is coasting, the current produced by the motor being supplied to the battery.

With the Thomas transmission the motor speed is theoretically intended to remain constant. The various units of the transmission vary in their speed in accordance with the speed of the vehicle. Owing to the planetary gearing, the second electrical machine runs at the same speed as the engine but in the opposite direction when first starting. At this time the first electrical machine remains still.

Acceleration vs. Weight

At the conclusion of the gasoline-electric committee's report A. Ludlow Clayden read some notes on the observed acceleration of three cars which he said had been tested extensively on the same speedway. He produced tables and diagrams showing the relative power of each car, measured in tractive force between the tire and the road throughout the range of speed of 10 to 50 m.p.h. over which all three cars were tested. He then gave the results of calculating the total amount of work produced by the motor of each car during acceleration from 10 to 50 m.p.h. and compared this with the amounts of power needed to produce the observed acceleration supposing there were no mechanical or air resistance. From these two sets of figures it was made obvious that the lightest of the cars had a large amount of excess power, by reason of its lighter weight. It also appeared that the resistance of the cars through mechanical and air friction varied very greatly, in other words, the air and mechanical resistance which might have been expected to be the same for three cars of closely similar size actually proved to be variable by a large amount.

A Formula Wanted

The author asked for comment on the results which might lead to additional subjects which might be studied, having a bearing on the matter, stating it to be his ambition to discover a formula which would be useful to engineers in laying out a car with a certain acceleration performance as their ideal. To discover what is the inter-relation between the weight, the horsepower curve, the gearing, etc., and the acceleration. It was stated that the author's intention was to complete a paper in proper form in a few months and he asked for suggestions that would help him in his at-

tempt to discover something which engineers would find really useful.

Carburetion a Factor?

Several of the members who entered the discussion were of the opinion that carburetion would have much to do with the final results obtained. Herbert Chase, engineer of the Automobile Club of America, stated that he had noticed in block tests that whereas two motors may have the same horsepower curves the acceleration figures would differ owing to varying carburetion. It was also brought out that accurate drawbar pull figures would help in securing a clue to the performance of the car and would show how much of the lost energy was consumed in the car and how much through the motor.

—

Parry Co. to Build Commercial Bodies, Tops and Trailers

INDIANAPOLIS, IND., Nov. 20—The Parry Mfg. Co., this city, manufacturer of horse-drawn vehicles, has developed a line of commercial bodies for automobile chassis, as well as two models of trailer and a variety of tops of all styles. The chief activities of the company in its commercial body line have been directed toward designs for the Ford chassis, although bodies for other makes are not to be neglected. The trailers are a two-wheeler and a four-wheeler, the connection provided being an adaptation of the Bradley coupler, permitting a straight pull on both ends of the axle that adapts itself to the motion of the vehicle to which the trailer is attached. These new lines will not interfere in any way with the manufacture of the company's horse-drawn vehicles.

—

Babcock to Build Commercial Bodies for Fords in Quantity

WATERTOWN, N. Y., Nov. 20—The H. H. Babcock Co., this city, is building commercial bodies for Fords in thousand lots on the unit plan. There are eight different types, to fit every requirement in light delivery service, built up from one standard body-base by adding units. The bodies are delivered painted, complete with all fittings and ready to assemble.

—

Gobron, French Car Maker, Killed

PARIS, Oct. 28—Jacques Gobron, one of the partners in the Gobron Automobile Co., of Billancourt, near Paris, is reported killed in an aerial fight with a German machine. He held the military rank of lieutenant and joined the French air forces at the outbreak of war. Jacques Gobron was responsible, with his brother Jean, for the Gobron automobile factory, their father, Senator Gobron having died a couple of years ago. The company was very prominent, in the early days of the industry, for its double-piston motors.

Order 21,382 New 6-30 Chalmers

600 Dealers, in Record-Breaking Convention, Find 288 Demonstrators Ready

DETROIT, MICH., Nov. 19—Six hundred dealers representing the Chalmers Motor Co. in all parts of the country took the city by storm, and they are said to have contracted for 21,382 of the new Six-30's before they left. This is more than the factory can produce up to next June, as President Hugh Chalmers promised an output of 18,000 between now and then.

Three very full days of fun and business for the Chalmers representatives ended with a banquet at the Detroit Athletic Club to-night, and it was a fitting climax of a convention which was undoubtedly the largest of its kind ever held here, if not in the industry. An army of the new Chalmers sixes transported the dealers to and from the factory and the hotels, and everything was done for the visitors to make their stay profitable and enjoyable.

Starting on Monday morning, Nov. 15, with an opening address by President Chalmers, the convention was well under way the first day. A dinner in the convention hall of the Pontchartrain Hotel ended the opening day; on the following evening a beefsteak dinner and smoker was held at the Statler Hotel; and Mr. Chalmers' closing address on Opportunity at the banquet at the Athletic Club was the parting word.

Roadster Out April 1

Paul Smith announced that a roadster will be supplied on the same chassis as the touring model Six-30 on April 1.

A feature of the convention was a parade of 288 of the new Six-30 cars and enough other Chalmers cars to bring the total in line to over 300. This long line of machines coursed through the main streets and boulevards of the city in the afternoon of the first day, following the opening session at the factory when the new model was revealed to the dealers. It is said that this is the largest number of cars that a manufacturer has had ready in the history of the industry on the occasion of the coming of the dealers. Following the opening session, the doors were thrown open and the dealers saw before them the long line of nearly 300 cars. Each car was tagged with the name of the dealer to whom it was allotted as a demonstrator, and the men had a merry time finding their own cars. It was like a gigantic dinner party, at which each guest must hunt for his place card.

In addressing the dealers Hugh Chalmers gave them due credit for the part they have played in the development of the Chalmers company. Eight years ago it was started here with a capital of $150,000, and to-day it has a capitalization of $8,000,000, and occupies twenty-four buildings on 26 acres of ground.

"Since we last met at Cedar Point a year ago last July," said Mr. Chalmers, "much has happened in the world. At that time the entire world was at peace. Now about three-fourths of the civilized world is engaged in warfare. Much as we deprecate this war, and would pray God it may end soon, it isn't of our making, and it isn't within our power to stop it. I think we should all pause for a moment and thank God that we are American citizens; and, in the second place, we ought to be thankful that we are engaged in an industry that commands the respect of the entire country, because it has proved in these troublous times that it is not of mushroom growth, but is one of the real, stable industries of the time, and it has done much to steady the hand of business during these disturbed days.

Existence Enforces Progress

"Not only have we seen great world changes in the last sixteen months, but we have seen great changes in our own automobile industry, and while it has been a prophecy for a long time that the automobile business would result in a survival of the fittest, this is no longer a mere prophecy; it is a reality to-day. It is no longer possible for a company to stand still in this business, because to stand still is to retrograde. I believe that the successful companies must continue to grow bigger or else go out of business, because competition is going to be even keener in the future than it has been in the past.

Selling Most Important

"There are four great elements in the manufacturing business. These are selling, making, recording and the management forces. While I do not wish to minimize the difficulties of making or recording, or of the management, yet I can truthfully say that selling is the most important part of any business. The reason for it is quite apparent if you will study the question for a few minutes. If we make one car right, we can from that model make 1,000,000 just like it, if we choose to do so, because the making of these cars is wholly within our control. We buy the materials, put up the buildings, buy the machinery, employ the men, raise the capital, or borrow it, and with these things we can create what is called a manufacturing plant. But this plant would be a mere tombstone in activity if it were not for the selling force which makes it possible for the wheels to run."

Isaac F. Marcosson, a noted writer and lecturer, when speaking before the

Chalmers men on the subject of The War and Salesmanship, said in part:

"Undoubtedly the most impressive feature of the foreign conflict and one that stands out as the single big lesson of the war, is the value of preparedness. The Germans were prepared for the great business of war. When they started the war, they had the map of every country in the world literally under their hats. Before the war cloud ever appeared, they had exhibited similar traits in their business transactions with the rest of the world.

"When they started out to conquer the commerce of the world, they first found out what their customers wanted and gave it to them. They knew their market, and sent out men who spoke the language of the countries in which they marketed their goods. Furthermore these men lived in their adopted countries and became a part of the commercial fabric.

"Contrast the conditions in England at the outbreak of the war with those in Germany at the same period. Here unpreparedness is as great a lesson as Germany's preparedness.

War at Motor Car Speed

"It is hard for us to realize the part the motor car is playing in the war. Without motor cars, the war could never have been carried on in its present scale. Wherever you go in Europe, you find the war geared up to the motor car.

"The war has taught us a great lesson in civilization. I am glad to see that business is neutral—there is no creed in salesmanship. We are at present on the verge of a great era of prosperity, and all conditions point to the fact that the great business of the future will be the defensive of peace, instead of toward the offensive of war."

—

Becker Is Lakey Foundry Manager

MUSKEGON, MICH., Nov. 20—With the appointment of Herman A. Becker, as general manager of the Lakey Foundry Co., this company will enter upon a new era of expanding its business. A new machine shop to take the place of the present one will be started at once. It will be constructed around this old shop in order not to interfere with the business of the company, which is growing with considerable rapidity.

Mr. Becker comes from the Rutenber Motor Co., Marion, Ind. Previous to his connection with this concern he was with the Allis-Chalmers Co., Milwaukee, Wis., for fourteen years.

—

Foundry Buys Havers Plant

PORT HURON, MICH., Nov. 17—The plant of the defunct Havers Motor Car Co., has been purchased by the Romeo Foundry Co.

Henry Ford & Son Is Tractor Firm

—

Profits To Be Divided Among Plant Workers and Tractor Buyers

DETROIT, MICH., Nov. 20—The Ford tractor will be made by the firm of Henry Ford & Son, Dearborn, Mich. So it was stated by Henry Ford. There will be no stockholders and the profits of the company, at least a large percentage, will be divided among the workers of the plant and among the purchasers of the tractors, it being intended to sell them under a profit-sharing system.

The big new main plant which is to make Dearborn known a little better throughout the country and the whole world and which is to supersede the present old factory buildings, is to be a four-story building, 160 by 800 ft. Several small buildings which will be a part of the whole works have been under construction for some time, as for insctance the power plant and the pattern shops, the latter now being completed.

Several hundred thousand dollars will be expended in making the plant the biggest and best equipped tractor plant in the world. It is stated that Mr. Ford will invest up to $1,000,000 in the plant.

—

Industrial Mfg. Co. Formed

MILWAUKEE, WIS., Nov. 20—The interests owning the Industrial Controller Co., this city, have organized a separate company, known as the Industrial Mfg. Co. to do tool, gage and die work for outside concerns, and make a specialty of such jobs for motor car and truck builders. The regular line of work, electrical and other controlling devices, will not be discontinued, however, as the company has orders to keep it busy for more than twelve months. The works are well equipped and additional machinery will be installed as needed. The owners of both concerns are Charles G. and James B. Welch, formerly of the Welch Bros. Motor Car Co., state agents for the Packard, and Frank W. Magin, engineer and designer. The Industrial Manufacturing Co. is capitalized at $50,000 and headquarters will be in the Controller company's offices and works.

—

Newman to Entertain 1400

MILWAUKEE, WIS., Nov. 20—Harry Newman, Inc., Chicago, Ill., appointed distributor of Chalmers cars in Wisconsin, Upper Michigan and southeastern Minnesota, announces that although Mr. Newman will take personal direction of the new business, Stanley E. Comstock, formerly with the Thos. B. Jeffery Co., will be general sales manager, with Snow E. Williams, Chicago, as assistant sales manager. A. H. Speulda, Chicago, will have charge of the business department of the headquarters and service station, now being established in the former packard garage at Grand Avenue and Seventh Street, Milwaukee.

Mr. Newman has issued invitations to 1400 dealers of the territory, to be his guests at Milwaukee on Friday, Dec. 3, which is designated Newman Day. The object of the assembly will be to discuss ways and means for the betterment of conditions in the trade and to establish friendly relationships among dealers. Mr. Newman will tender a banquet to the visitors on the evening of Dec. 3 at the Hotel Pfister.

—

Berger Is Manager of New York Lozier Branch

NEW YORK CITY, Nov. 22—L. B. Berger, Lozier factory sales manager, has also been appointed manager of the New York branch. Previous to his connection with the Lozier company he was with the Willys-Overland company in charge of Willys-Knight sales. He has installed a service system which allows any new owner of 50 hr. of free service. A book is issued containing 100 ½-hr. coupons and these are good at any time.

—

Simms Additions Under Way

EAST ORANGE, N. J., Nov. 19—Two concrete and brick additions to the plant of the Simms Magneto Co., Bloomfield, N. J., are well under way. One building will be 42 by 70 ft. and will contain the grinding and dipping departments, while the other is 72 by 90 ft. and will house the storage and shipping departments. The additions became necessary to make way for more machinery in the main factory, the entire output of the plant being contracted for well into 1916.

—

Baird Saxon Manager in New York

NEW YORK CITY, Nov. 22—Frank S. Baird has become retail sales manager of the Saxon Motor Co. of New York. He was formerly with the Chevrolet Motor Co. in the sales department. H. C. Turner has also joined the New York branch, coming from the Saxon factory.

—

Carpenter Represents Pierce in Brooklyn

BROOKLYN, N. Y., Nov. 20—H. L. Carpenter has become associated with the Pierce interests and the Harrolds Motor Car Co., representing both the passenger car and trucks of the Pierce-Arrow company in Brooklyn and Long Island.

—

Fafnir Bearing Branch in Chicago

NEW BRITAIN, CONN., Nov. 22—The Fafnir Bearing Co., this city, has recently opened a new branch office at 39 South Clinton Street, Chicago, Ill., with D. D. Davis as manager.

79,759 Cars in Wisconsin

26,600 New Cars Bought in 1915—Expect 80,000 Registrations by Dec. 31

MILWAUKEE, WIS., Nov. 20—Wisconsin automobile registrations by private owners for the calendar year ending Dec. 31 will aggregate approximately 80,000 or 5000 more than anticipated at the beginning of the year. At the close of business on Nov. 18, the Secretary of State's office in Madison reported a total issue of 79,759 licenses to private owners, or only 241 shy of the coveted figure, 80,000. It is considered hardly possible that there will be 241 more licenses issued before the end of the year, when all licenses expire. However, applications have been coming in at the rate of fifteen to twenty-five daily since Nov. 10. On Oct. 25, the total registration was 79,100, showing that between Oct. 25 and Nov. 18, 659 licenses were issued. These figures do not take into account the registration by dealers, of which there are 1581. The motorcycle registration is 8579. Private owners pay $5 as the annual fee, regardless of the period during any calendar year that application is made. Dealers pay $10 per annum, and receive four sets of license plates. Motorcyclists pay $2 per annum.

The total registration of private owners for the year 1914 was 53,161. On the basis of figures issued Nov. 19, the gain for 1915 already is 26,598, or nearly 1600 more than conservative estimates of the probable gain made at the beginning of the year. This goes to prove that Wisconsin absorbed approximately 26,600 new cars during 1915, inasmuch as licenses are annual and licenses are transferable on the sale of the car to hold good on the new car, and the purchaser of the old car is required to take out a $5 license.

—

Boston Dealers Win Fight Against Bad Law

BOSTON, MASS., Nov. 20—Boston automobile dealers have won their fight against the law that was being enforced to class them among the junk-dealers and pawnbrokers. It started a few weeks ago when the police officials went about among them and requested that each one take out a license at $5 to do business in second hand cars, and they were notified not to sell any cars that they took in before thirty days. The dealers refused because it would be a very serious hardship to them.

So acting under orders one of the police officials arrested F. A. Hinchcliffe, manager of the New England branch of the Winton Motor Car Co., charging him with refusing to take out a license, and also with the selling of a car before the thirty-day period expired.

The Boston Automobile Dealers' Association decided to fight the case for Mr. Hinchcliffe, and so their attorney John B. Sullivan, Jr., appeared for him. The attorney showed that the intent of the law was to protect people from disposing of small things that had been stolen, not motor cars. He also showed that by paying a license to the State to do business as motor dealers they could not be expected to pay another license to the city of Boston, as no other class of people have to pay two licenses to do business. After hearing the argument by the police attorney the judge stated that there was no violation of the law and discharged Mr. Hinchcliffe.

—

Commercial Agency Liable for Misleading Credit Reports

NEW YORK CITY, Nov. 20—The Appellate Division decided here this week that the Bradstreet Co. is liable to its subscribers for damages sustained when misleading information is furnished to them by the company. The case is of importance to all concerns depending upon commercial agencies for information concerning the credit of customers.

The case was that of A. J. Munro, a fur dealer, who lost $1,650 on furs delivered to the firm of Jackson & Sulzer, now bankrupt. Depending upon information concerning the firm supplied him by the Bradstreet Co., Munro extended credit to Jackson & Sulzer who shortly after were petitioned into bankruptcy.

The Bradstreet Co.'s defense stated that its contract with Munro absolved it from any responsibility for errors in information furnished concerning the standing of a commercial house. Justice Laughlin, writing the prevailing opinion, concurred in by Justices Dowling and Scott, says in part:

"A reasonable construction of the agency contract, I think, is merely to relieve the defendant from errors and mistakes, but not from knowingly making a false report, or gross mistake, or gross negligence in making a report to the plaintiff."

—

Missouri Registrations Gain 45 Per Cent

JEFFERSON CITY, MO., Nov. 19—In the nine months ending Nov. 1, 20,804 more automobiles were registered in Missouri than in the whole year of 1914. This increase of about 45 per cent is shown in figures given out at the office of Secretary of State here to-day.

Last year a total of 54,489 motor vehicles were licensed in Missouri. In the first nine months of the current registration year, 75,293 licenses were issued. Of these, 15,199 went to St. Louis and 9,168 to Kansas City. One-third of the total are owned by farmers.

Co. To Build Cars and Tractors

Corliss Steel Co., Racine, To Also Make Gas Engines, Tools and Metal Products

RACINE, WIS., Nov. 20—The organization of the Corliss Steel Co., Racine, Wis,. with a capital stock of $10,000, is believed to be the preliminary step in the establishment of a large automobile, tractor and engine business. The promoters of the new company are all well known in the motor car industry, being F. Lee Norton, for many years vice-president and general manager of the J. I. Case T. M. Co., Racine; Capt. William Mitchell Lewis, former president of the Mitchell-Lewis Motor Co., Racine, and Herbert F. Johnson, also of Racine.

The Corliss Steel Co. is organized for the purpose of manufacturing automobiles, engines, tractors, farm machinery, machine tools, and to make and deal in forged, stamped and pressed steel and metal products. While definite plans are withheld for the present, it is reported on good authority that the new concern will begin business in the big engineering works of the defunct Wisconsin Engine Co. at Corliss, Racine County.

—

Goby in Motor Engineering Co.

CLEVELAND, OHIO, Nov. 22—The Motor Engineering Co., West Third Street, Cleveland, Ohio, has been incorporated with a capital of $30,000 by C. S. Goby, formerly chief engineer of the Goby Engine Co., and others. The company will manufacture motors and automobile parts; conduct experimental work, such as designing and general engineering work pertaining to automobiles. The new factory building now in process of construction will be occupied by the new organization about Jan. 1.

—

Gorey Buys Herreshoff Parts

NEW YORK CITY, Nov. 22—J. C. Gorey & Co., this city, has purchased from the American & British Mfg. Co., Bridgeport, Conn., all the remaining parts, jigs, tools, dies and patterns of the Herreshoff car and can now supply any material for these cars.

Last year the company purchased from the Timken Detroit Axle Co. all the remaining rear and front axles, together with the remaining parts of the Herreshoff car.

—

Dimmer Ordinance for Wilmington

WILMINGTON, DEL., Nov. 22—A dimmer ordinance has been passed for Wilmington by the Street and Sewer Commissioners, who have control of the

streets, and it will become effective Dec. 10. It is similar to the Baltimore law, the requirements being as follows:

All automobile lights in the city at night must be dimmed to at least 30 candle-power for headlights and 4 candle-power for side lights, under penalty of from $1 to $5 for the first offense and $25 for each offense after the first.

The owner of a car is held responsible unless he can supply the police with information to prove that some other person is responsible.

The ordinary "dimmer" or auxiliary lights operated by a switch from the seat will not be permitted unless the headlight itself so operated is itself so shaded or constructed that even when cut in from the seat it will not produce glare.

Gas and electric lights are permitted where they do not exceed 4 candle-power.

The use of any headlight of not over 30 candle-power will be permitted where the glass is covered with tissue paper, paint, frosting or any other substance of sufficient capacity to prevent the outline of the flame being made out.

The requirements do not apply to non-residents who are complying with the laws of their own States, unless they are asked by the police to shut off or dim their lights, which they must do.

—

After Short-Measure Gasoline Dealers

COLUMBUS, OHIO, Nov. 21—Thomas L. Calvert, chief of the dairy and food division of the Ohio Agricultural Commission, who also looks after weights and measures, is going after garages which give short measure in the sale of gasoline. A number of inspectors have started out in response to complaints from numerous automobile owners that small garages and store proprietors are giving short measure in their measuring apparatus. The law provides for a fine of $500 and six months in jail, upon conviction.

—

New Traffic Rules for Ohio

COLUMBUS, OHIO, Nov. 20—Under the provisions of the new Cass highway law, State Highway Commissioner Clinton Cown has prepared a set of traffic rules and regulations to be effective on and after Dec. 5. Some of the rules must be obeyed under penalty of the law while others are merely suggestions, one of the latter being to the effect that all vehicles, whether horse-drawn or motor-driven, be equipped with lights at night. Some of the points forbidden by the new regulations are: Unnecessary emission of dense smoke from motors; riding on any vehicle without consent of the driver; and permitting horses or domestic animals to run loose on the highways.

—

Bijur Strike Off in September

HOBOKEN, N. J., Nov. 23—The article in THE AUTOMOBILE for Nov. 18 stating that the Bijur machinists had returned to work was an error as there was not a strike. There was a strike during the latter part of August which was declared off around Sept. 13 without the company giving in to the strikers.

Territories Buying More Cars

—

Exports to Hawaii, Porto Rico, Philippines and Alaska Show Increase

WASHINGTON, D. C., Nov. 21—Figures have been compiled by the Department of Commerce showing the commerce of the United States with its noncontiguous territories during September and the nine months ended September, together with figures for the corresponding periods of last year.

Eighteen automobiles valued at $20,879 were shipped to Alaska during September, as against three cars, valued at $5,100 shipped in September a year ago. During the nine months' period the shipments increased from fifty-four cars, valued at $69,703, in 1914, to seventy-three cars, valued at $97,926, in 1915.

Shipments of cars to Hawaii show a healthy growth. During September a year ago the number was seventy and the value $75,976, increasing to 169 cars, valued at $180,083, in September last, while during the nine months' period the number increased from 616 cars, valued at $649,282, in 1914, to 857 cars, valued at $926,994, in 1915.

Automobiles to the number of thirty-four, valued at $33,542, were shipped to Porto Rico in September a year ago, while during September last the number was 103 and the value $83,052. During the nine months' period these shipments increased from 248 cars, valued at $235,357, in 1914, to 529 cars, valued at $421,815, in 1915.

There were eighty-four cars, valued at $168,491 shipped to the Philippine Islands in September last, as against four cars, valued at $4,240, shipped there in September a year ago. During the nine months' period these shipments rose from 355 cars, valued at $360,751, in 1914, to 573 cars, valued at $681,712, in 1915.

—

French Automobile Men Not Captured—Where They Are

PARIS, Oct. 23—German newspapers have informed their readers that M. Delaunay, of the Delaunay-Belleville Automobile Co., has been captured while serving as an aeroplane pilot in the French army, and also that Georges Sizaire, Albert Guyot and Arthur Duray have been made prisoners while driving automobiles at the front.

Fortunately there are a few errors in the report. No person of the name of Delaunay is attached to the Delaunay-Belleville company, the proprietors of that concern being Robert and Pierre Delaunay-Belleville, both of whom are attached to their factory, in the suburbs of Paris, and engaged on the construction of war material. The report seems to have as its foundation the capture, early this year, of a young aeroplane pilot named Delaunay, who has no connection whatever with the Delaunay-Belleville family. Delaunay was a competition driver before the war and won the last Tour de France on a Pierron car. After serving as an automobile driver at the front, he was transferred to the Flying Corps, and on his first outing lost his way and came down in the enemy's lines.

Guyot in Argonne

Since the German report appeared, Georges Sizaire has taken President Poincare on two trips to the front, and at the present moment is in Paris, attached to the President's reserve staff. Albert Guyot is attached to the headquarters staff of one of the armies operating in the Argonne, and has only been away from the front six days in fifteen months. Guyot, who is a certified aviator, having been the first man to fly in Russia, has applied for a transfer to the Flying Corps, and expects to be moved shortly.

Duray on Special Work

Arthur Duray, runner-up in the 1914 Indianapolis race, is attached to what is known as the General Automobile Reserve, and is driving a Delaunay-Belleville car. Duray, who volunteered for service, was attached to Minister Viviani for several months, and is now undertaking special missions from Paris to the front. Boillot has been made sub-lieutenant and is learning to be an aeroplane pilot. Goux is driving the military governor of Belfort. Jean Chassagne, the Sunbeam expert, has been taken out of the artillery, where he was serving as a sub-officer, and is now attached to an important aerodrome in the suburbs of Paris. He is in charge of a team of mechanics fitting Sunbeam twelve-cylinder motors to French aeroplanes. Victor Rigal, who has been both a Sunbeam and Peugeot driver, and has performed in America, is now a sub-lieutenant in charge of an automobile convoy.

Among the old-time automobile drivers Victor Hemery is a driving instructor; Louis Wagner, of Vanderbilt fame, is serving in the artillery; Rougier is an aviator; Henry Fournier has charge of a shell-making factory; Maurice Sizaire, of the Sizaire-Berwick Co., is in command of an automobile repair shop at the front; Caillois is doing similar work at Chalons; Charles Faroux, automobile editor, is attached to the government aeroplane motor laboratory and tests all new motors before they are accepted by the army; René Thomas is making aeroplane motor parts in his own shop, near Paris.

Gasoline Prices Are Higher

1-Cent Advances Reported Throughout Country—Miller Rubber Co. Elect Officers

NEW YORK CITY, Nov. 23—The rise in the price of gasoline in this city yesterday to 19 cents a gallon, has followed similar ones in the large cities throughout the country. The 1 cent rise in New York results in a corresponding advance in the retail price to 21 cents a gallon.

In other eastern cities, such as Boston, Newark and Buffalo, prices have received 1-cent advances, tank wagon basis.

In the West, including such cities as Chicago, St. Louis, Denver and points in Texas, gasoline yesterday was quoting at 1 to 2 cents higher. In Texas, the present price is 19 cents a gallon, an advance of 2 cents. For the fifth time in about two months the price of gasoline has gone up 1 cent in St. Louis, quoting at the filling stations at 15 cents. The price will be duplicated by the independent companies. Gasoline prices have been advanced 1 cent a gallon, tank wagon basis throughout Wyoming, Montana and Colorado by leading distributors. Denver prices are now 18 cents a gallon, tank wagon basis. The price to consumers is 19 cents. This is the sixth advance in the retail price within sixty days. Chicago prices have been advanced 1 cent to 14.102 cents a gallon, flat, tank wagon basis.

A further tightening of gasoline prices in the Milwaukee district is indicated by the announcement issued on Nov. 19 by the independent jobbers to the effect that the quotation on tank wagon delivery in lots of 100 gal. or more has been withdrawn, and in the future the quotation will be on the existing tank wagon delivery basis, any quantity. The 100-gal. quotation has been uniformly 1 cent under the ordinary tank wagon price, which is about 1 cent lower than the filling station quotation. The announcement, in effect, means a 1-cent increase in tank wagon prices for large lots. Only two sets of quotations will be issued until further notice, as follows:

Sp. Gr.	Filling Station (cents)	Tank Wagon Delivery (cents)
59°	14.5	13.6
62°	16.0	15.0
65°	19.0	18.0
70°	22.0	21.0

Miller Rubber Officers Re-elected

AKRON, OHIO, Nov. 20—At the annual stockholders' meeting of the Miller Rubber Co., recently held here, all the officers and directors were re-elected. This includes Jacob Pfeiffer, president, C. T. Grant, vice-president; F. B. Theiss, treasurer and assistant secretary; W. F. Pfeiffer, secretary and assistant treasurer. They, together with J. M. Doran, comprise the board of directors.

The president's report showed an increase in surplus to $813,000, and common dividends were increased from 10 to 12 per cent per annum, as reported in THE AUTOMOBILE for Nov. 18. Sales for the year were 30 per cent greater than the year previous. The company also increased its floorspace during the year by 6½ acres.

Markets Continue Rise

NEW YORK CITY, Nov. 23—Market prices soared last week. With the exception of tin which dropped $3.75 per 100 lb., prices were extraordinarily high. Crude oil from Pennsylvania is now selling at $2 a barrel and Kansas crude is quoted at $1. Both electrolytic and Lake copper reached new high marks when the market closed last night. Eectrolytic, after an advance of ¼ cent, closed at 20 cents a pound. There is an enormous domestic demand with large buying for future delivery. Foreign orders for copper have not shown any signs of slackening.

Crude rubber prices reached new high marks. Up-River Para yesterday sold at 75 cents a pound. First latex pale crepe rubber from Ceylon rose to 83 cents. For several weeks the quotations for both Para and Ceylon grades have been advancing, but at no time has there been such a big jump as between last Saturday and yesterday. Higher prices are looked for. The recent closing of the Suez canal by the English government had a potent effect on the quotations. Authorities state, however, that this is not the only reason for the high prices. The stocks of plantation rubber actually in the London market are not very large. According to a recent cable, there were 3200 tons lying outside that had not been unloaded. The closing of the canal will mean that it will take three weeks to a month more to lay down plantation rubber in London than formerly. The amount of Para rubber on hand in Brazil is said to be only moderate.

Bill for More Severe Punishment in Bay State

BOSTON, MASS., Nov. 20—A bill has been filed in Massachusetts to make the penalties more severe for motorists. If a motorist goes away after an accident the penalty is to be a fine of not less than $100 nor more than $1,000, and imprisonment for not less than three months nor more than three years, or both a fine and imprisonment.

In case death results and the driver is apprehended after fleeing the penalty is to be not less than ten years nor more than twenty years. Also it makes it prima facie evidence of willful neglect and criminal intent, and in a suit for damages if the injured person wins the judge shall order that whatever sum is awarded by the jury shall be tripled.

Where convictions occur on charges of operating while under the influence of liquor the clerks of the courts are ordered to notify the Highway Commission within 24 hr. That body is then to suspend the license indefinitely. A second conviction on the same charge calls for the permanent revocation.

New Paterson Distributor in Phila.

PHILADELPHIA, PA., Nov. 19—The Paterson Motor Sales Co., this city, has been formed by C. O. R. Kindig and D. M. Martin, formerly with the Maxwell Motor Co., with temporary offices at Broad and Race Streets. The company has been incorporated and Mr. Kindig is president. Mr. Martin, who is vice-president and treasurer, will concentrate on the wholesale end.

Stewart-Warner Salesmen Meet

CHICAGO, ILL., Nov. 22—The sales force of the Stewart-Warner Speedometer Corp. concluded a five-day meeting here yesterday in which three days were given to factory inspection and two days to a convention at the Hotel Sher-

Daily Market Reports for the Past Week

Material.	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum	.58	.58	.58	.57	.58	.57	—.01
Antimony	.36	.37¼	.37½	.38	.38	.38	+.02
Beams and Channels, 100 lb.	1.77	1.77	1.77	1.77	1.71	1.77	...
Bessemer Steel, ton	25.50	28.00	28.00	27.00	27.00	27.00	+1.50
Copper, Elec., lb.	.18½	.19	.19	.19¼	.19¼	.19¾	+.01¼
Copper, Lake, lb.	.18½	.19	.19	.19¼	.19¼	.19¾	+.01¼
Cottonseed Oil, bbl.	7.74	7.77	7.80	7.88	7.85	8.06	+.32
Cyanide Potash, lb.	.23	.23	.23	.23	.23	.23	...
Fish Oil, Menhaden, Brown	.47	.47	.47	.47	.47	.48	+.01
Gasoline, Auto, bbl.	.18	.18	.18	.18	.19	.19	+.01
Lard Oil, prime	.92	.92	.92	.92	.92	.92	...
Lead, 100 lb.	5.25	5.25	5.25	5.25	5.25	5.25	...
Linseed Oil	.64	.64	.64	.65	.64	.64	...
Open-Hearth Steel, ton	27.00	28.00	28.00	28.00	28.00	28.00	+1.00
Petroleum, bbl., Kansas, crude	1.00	1.00	1.00	1.00	1.00	1.00	...
Petroleum, bbl., Pennsylvania, crude	1.90	1.90	2.00	2.00	2.00	2.00	+.10
Rapeseed Oil, refined	.85	.85	.85	.85	.85	.85	...
Rubber, Fine Up-River, Para	.64	.64	.65	.67	.68	.75	+.11
Silk, raw, Italian	4.80	...	4.90	...	...	4.95	+.15
Silk, raw, Japan	4.55	...	4.75	...	...	4.85	+.30
Sulphuric Acid, 60 Baume	1.00	1.00	1.00	1.00	1.00	1.00	...
Tin, 100 lb.	43.50	43.00	41.63	40.63	40.63	39.75	—3.75
Tire Scrap	.04¾	.04¾	.04¾	.05	.05	.05	+.00¼

man. Thirty-eight representatives from all parts of the country were in attendance. During the three days at the factory they were given practical demonstrations of the mechanical features of the company's product and at the two-days' convention, that which they had seen demonstrated at the factory was further explained by means of charts and diagrams. Luncheon was served on the last day.

—

White Not to Exhibit

NEW YORK CITY, Nov. 22—The White Co., Cleveland, Ohio, has decided not to exhibit at either the New York or Chicago show. It is understood that one cause of the company deciding not to exhibit was that at the recent drawing for space, a new rule was put into force by which the order of drawing was in proportion to the amount of passenger car business done during the previous year, whereas formerly the order of drawing was determined by the total volume of business of passenger cars and trucks. White is one of the largest producers of trucks and voting this part of their business out of the reckoning naturally placed them further back in the list of drawing.

—

Ames Co. Handles Packard and Dodge

OWENSBORO, KY., Nov. 20—The Ames Motor Car Co., this city, has secured the agency for the Packard and the Dodge.

—

Ford Parts Sold in 10-Cent Store

PHILADELPHIA, PA., Nov. 20—Parts for Fords are being sold in a 10-cent store in this city. A counter is being devoted exclusively to the sale of parts for Ford cars at 10 cents each.

Securities Continue to Rise

—

Paige 110-Point Rise and Ajax-Grieb 50-Point Feature Market

NEW YORK CITY, Nov. 23—Automobile and tire issues continued their upward movement in prices last week, some of the stocks reaching new record marks. General Motors gained 27 points and reached the high mark of 419; Goodyear closed at 338 with a gain of 10 points; Paige-Detroit made a record mark of 660 or 110 points higher, the stock last week showing an 85-point rise, and Ajax-Grieb, which closed on Saturday at 350, developed a 50-point rise.

A number of the stocks rose to high points during the week and then dropped, among these being Willys-Overland, which rose to 245 on Wednesday and then dropped to 228 on Saturday, and Studebaker, which rose to 167½ on Wednesday and then dropped to 151 on Saturday.

Saxon Stock Sells Well

The subscriptions for stock of the Saxon Motor Co. are coming in very heavily and it is expected that the stock will be oversubscribed.

Several issues dropped, notably Portage Rubber common, which went down 15 points, and Kelly-Springfield second preferred, which dropped 18 points. Peerless common went down 5½ points and Chalmers common dropped 5 points. Willys-Overland common closed with a 19-point loss.

There were a few small gains such as 5 points for Reo Car; 6 and 2 points for Stewart-Warner common and preferred; and 2 points for General Motors preferred.

—

Auto Wheel Co. Adds Again

LANSING, MICH., Nov. 17—For the third time since March 1, an addition to the plant of the Auto Wheel Co., is to be built. It will take the place of a wooden building and will occupy all the vacant land on the west side of the plant. Ten new dry kilns will be installed, bringing up the total the company will have to twenty-seven. At least fifty more workingmen will be given employment by Jan. 1. The additions and new equipment put in by the company this year represent an expenditure totalling to $75,000.

—

Studebaker Service Building Finished

NEW YORK CITY, Nov. 22—The Studebaker storage and service building in Long Island City has been completed and will be occupied this week. It is a concrete structure 80 by 160 on the western side of Anable Avenue, south of Meadow Street.

—

Owner Convicted of Manslaughter in New York

NEW YORK CITY, Nov. 18—The first conviction for manslaughter resulting from an automobile accident that ever has been found in Queens County was returned yesterday by a jury in the case of M. H. Conroy, who ran over a Long Island Railroad flagman. The conviction was liable to carry a 15-year sentence, but Judge Humphreys inflicted a penalty of only three months imprisonment.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Ajax-Grieb Rubber Co., com.	150	..	350	450	+50
Ajax-Grieb Rubber Co., pfd.	100	..	101	110	..
Aluminum Castings, pfd.	..	..	..	..	..
J. I. Case, preferred	..	..	..	..	..
Chalmers Motor Company, com.	..	97	145	160	—5
Chalmers Motor Company, pfd.	..	93½	102	104	..
Chevrolet Motor Co.	..	..	123	126	..
Electric Storage Battery Co.	..	..	..	..	..
Firestone Tire & Rubber Co., com.	..	..	..	..	..
Firestone Tire & Rubber Co., pfd.	..	..	..	..	..
General Motors Company, com.	61	62½	419	423	+27
General Motors Company, pfd.	82½	83½	114½	116	+2
B. F. Goodrich Company, com.	20	22	70	71½	—3
B. F. Goodrich Company, pfd.	87	..	111	112	..
Goodyear Tire & Rubber Co., com.	175	187	338	342	+10
Goodyear Tire & Rubber Co., pfd.	..	..	111	112½	+1
Gray & Davis, Inc., pfd.	..	..	..	..	..
International Motor Co., com.	..	..	35	38	—3
International Motor Co., pfd.	..	..	55	65	—9
Kelly-Springfield Tire Co., com.	53	54	297	302	+2
Kelly-Springfield Tire Co., 1st pfd.	70	75	75	77	—18
†Kelly-Springfield Tire Co., 2nd pfd.	85	95	270	277	..
Maxwell Motor Company, com.	14	14½	72¾	73¾	—5¼
Maxwell Motor Company, 1st pfd.	43	45	99	101	—2
Maxwell Motor Company, 2nd pfd.	17	18	56	56½	—5
Miller Rubber Company, com.	..	..	248	250	—1
Miller Rubber Company, pfd.	..	..	109½	110½	..
New Departure Mfg. Co., com.	..	..	..	..	..
New Departure Mfg. Co., pfd.	..	..	..	..	..
Packard Motor Car Company, com.	..	100	130	135	—1
Packard Motor Car Company, pfd.	89	..	99	102	—1
Paige Detroit Motor Car	..	..	660	710	+110
Peerless Motor Car Co., com.	..	..	36	40	—5½
Peerless Motor Car Co., pfd.	..	..	..	..	..
Portage Rubber Co., com.	..	..	65	75	—15
Portage Rubber Co., pfd.	..	..	98	100	..
Regal Motor Co., pfd.	..	..	17	..	..
*Reo Motor Truck Company	10½	11½	21	22	..
*Reo Motor Car Company	21½	22½	54	56	+5
Splitdorf Electric Co., pfd.	..	..	..	..	..
Stewart-Warner Speed. Corp., com.	40	42	88	93	+6
Stewart-Warner Speed. Corp., pfd.	92	98	108	110	+2
Studebaker Corporation, com.	27	..	151	153	—9
Studebaker Corporation, pfd.	..	81	111	113	..
Swinehart Tire & Rubber Co.	..	..	..	90	..
Texas Company	..	..	..	..	..
U. S. Rubber Co., com.	43½	44½	53	54	—1
U. S. Rubber Co., pfd.	94	96½	107	108	+1
Vacuum Oil Company	..	..	..	..	..
White Company, preferred	..	..	110	..	..
Willys-Overland Co., com.	69	71	228	232	—19
Willys-Overland Co., pfd.	85	90	113	114	+2

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Chalmers Motor Co., com.	..	97	..	162	..
Chalmers Motor Co., pfd.	..	93½	..	..	..
Continental Motor Co., com.	155	180	242½	255	+8¾
Continental Motor Co., pfd.	..	75	90½	..	+1½
General Motors Co., com.	66½	68	400	430	+23
General Motors Co., pfd.	85¾	87	114	116	+1½
Maxwell Motor Co., com.	14	15	72	75	—1
Maxwell Motor Co., 1st pfd.	42½	45	99	101	—1½
Maxwell Motor Co., 2nd pfd.	18	20	53½	57	—5¼
Packard Motor Car Co., com.	..	100	134	..	+3
Packard Motor Car Co., pfd.	89	..	100	..	..
Paige-Detroit Motor Car Co.	..	..	675	..	+75
*Reo Motor Car Co.	21⅝	22¼	53½	54½	+1
*Reo Motor Truck Co.	10½	11⅛	21¼	22¼	..
Studebaker Corp., com.	..	..	150	154	—7½
Studebaker Corp., pfd.	..	..	109	114	—1

INACTIVE STOCKS

*Atlas Drop Forge Co.	..	25	..	29	..
Ford Motor Co. of Canada	..	500	2000	2750	..
Kelsey Wheel Co.	185	..	220	..	+5
*W. K. Prudden Co.	19	20½	24¾	25¾	+ ½
Regal Motor Car Co., pfd.	..	25	18	24	..

*Par value $10. †Old stock.

40 More Show Exhibitors

39 Additional Accessory Firms —Greer Co. To Show Ford at Chicago

NEW YORK CITY, Nov. 20—Thirty-nine accessory exhibitors have been added to the coming New York City and Chicago automobile shows and the Erwin Greer Co., will also exhibit the Ford car in Chicago. The new accessory exhibitors are:

AT BOTH NEW YORK AND CHICAGO

Cleveland Worm & Gear Co.	Cleveland, Ohio
Compression Inner Tube Co.	Louisville, Ky.
Gas Engine Efficiency Co.	St. Louis, Mo.
K-W Ignition Co.	Cleveland, Ohio
Motor Knowledge	New York City
Pull-U-Out Sales Co.	St. Louis, Mo.
Strauss & Buegeleisen	New York City
Swedish Crucible Steel Co.	Detroit, Mich.
Victor Lamp Co.	Cincinnati, Ohio
X Laboratories	Boston, Mass.

NEW YORK ONLY

J. Alexander Mfg. Co.	New York City
Bridgeport Coach Lace Co.	Bridgeport, Conn.
M. K. Bowman-Edson Co.	New York City
Cox Brass Mfg. Co.	Albany, N. Y.
Dayton Rubber Mfg. Co.	Dayton, Ohio
Disco Electric Starter Co.	Detroit, Mich.
Eastern Rubber Co.	Philadelphia, Pa.
Ericson Mfg. Co.	Buffalo, N. Y.
Hartford Clock Co.	Hartford, Conn.
J. H. Tonneau Shield Co.	New York City
Marathon Tire Sales Co.	New York City
Marvel Mist Mfg. Co.	Brooklyn, N. Y.
Motor Appurtenances Corp.	New York City
Motor Necessity Co.	Chicago, Ill.
Motor Products, Inc.	Stamford, Conn.
Norpareil Horn Mfg. Co.	New York City
G. Piel Co., Inc.	Long Island City, N. Y.
Stewart Accessories Co.	Detroit, Mich.
Utility Products Co., Inc.	New York City
Weston Electrical Instrument Co.	Newark, N. J.
Woodbridge Chemical Co.	New York City

FOR CHICAGO ONLY

Apex Electric Mfg. Co.	Chicago, Ill.
Auto Parts Mfg. Co.	Milwaukee, Wis.
Columbus Varnish Co.	Columbus, Ohio
Gray Bros. & Co.	Chicago, Ill
Greer College of Motoring.	Chicago, Ill.
W. H. Howell Co.	Geneva, Ill.
Simplex Short-Turn Gear Co.	Anderson, Ind.
Wales & Anderson.	Chicago, Ill.

—

Mail Trucks in St. Louis

ST. LOUIS, MO., Nov. 15—The St. Louis mail service to-day was motorized. Fifty new government owned motor trucks replaced the wagons, street cars, leased automobiles, bicycles and whatnots which heretofore had been used in collecting and delivering mail in this city and its suburbs.

Twenty of the trucks were delivered to the government by the General Motors Truck Co. of this city at a cost of about $30,000. Fourteen are of 1500-lb. capacity and six of 3000 lb.

—

Curbstone Dealers Need No License

LANSING, MICH., Nov. 18—According to an opinion given by Attorney-General Grant Follows, to Secretary of State Coleman C. Vaughan, automobile dealers or agents who sell cars but have no garage or do not operate a garage, and who are generally spoken about as curbstone dealers, do not have to take out a dealer's license. They must, however, register each machine they control and operate or get a general license number for them as provided by the law.

The opinion was brought about in reply to the following letter from the Secretary of State: "We have several parties in this place that are running a curbstone agency, that is, they have the agency for different makes of cars and are selling same but still do not run a garage. Can you tell us if these parties are supposed to have a dealer's license and pay a license of $50 like other parties who own garages, or are they exempt? We feel that if they are selling cars they should have a dealer's license and we would be pleased to have you advise us on the matter."

—

Cooper in Stutz Wins Ariz. Grand Prize

PHOENIX, ARIZ., Nov. 20—*Special Telegram*—Earl Cooper added another victory to the Stutz string to-day when he was awarded first honors in the Arizona Grand Prize, the closing feature of the annual State Fair. The race, scheduled for 150 miles was called at 5.25 p. m. because of darkness and dust. At that time Cooper was leading. He had covered 109 miles in 1 hr. 42 min. and 30 sec., an average of 63.8 m.p.h.

When the race was called Parsons, also at the wheel of a Stutz, was second, having completed 108 miles in 1:42, while Walterman, driving an Overland, was third, his time for 103 miles was 1 hr. 42 min. 31 sec. Out of a field of thirteen starters the following cars were still in the race when flagged:

Sebring, Haibe, 102 miles; Apperson, Price, 100 miles; Durant Special, Durant, 97 miles; Duesenberg, Bolden, 93 miles; Stutz, Wood, 93 miles; and National, Reeves, 86 miles.

Barney Oldfield's Fiat went out with a broken connecting-rod before it had covered a mile.

—

90 Per Cent Rebate to St. Louis Exhibitors

ST. LOUIS, MO., Nov. 19—A rebate of 90 per cent to exhibitors at the last annual automobile show held by the St. Louis Manufacturers' and Dealers' Association has been declared. Joseph A. Schlecht, chairman of the show committee, said that the earnings of the show would warrant even a 92.8 per cent rebate, but it was considered advisable to divert 2.8 per cent of the earnings into the treasury of the association.

This is the largest rebate ever paid in the history of the organization. The largest previous rebate was 60 per cent, paid to member exhibitors at the 1913 and 1914 shows. Exhibitors at the 1915 show who were not members of the association will not share in the rebate.

Rules for Amateur Race

Drivers Must Own Cars Which Must Be 1914 Models or Newer

CHICAGO, ILL., Nov. 22—The contest board of the Chicago Automobile Club has accepted a set of rules, drafted by a special committee, under which the amateur drivers' race, tentatively scheduled for the Chicago speedway in May, probably will be run.

The rules, which have been sent to the A. A. A. contest board for ratification, stipulate that only amateurs may participate in the proposed event and that each entrant must own the car. The nomination of any car antedating a 1914 model will be refused.

Each car must carry complete equipment as listed in the catalog of the maker, with the following exceptions—spare tires and wheels, tool box and jack. Lamps and windshields may be removed at the track on the day of the race but tops must be carried.

In order to qualify, each driver must make one lap of the 2-mile track at an average of 55 m.p.h. or better. After the time trials, the cars will be divided into three equal divisions and three elimination heats, each of 20 miles, run. The first four cars to finish in each heat will be eligible to compete in the finals, which will be a 50-mile contest.

Although the date of the proposed race is more than five months away, twelve entries already have been promised. They include four Mercers, three Stutzes, two Nationals, two Cadillacs and a Stearns-Knight.

—

Motor Mail Service for Chicago

CHICAGO, ILL., Nov. 19—Beginning Nov. 21, seventy-six White trucks will supplant the street car service between the main postoffice and the outlying substations. When circumstances permit all horse-drawn vehicles in the postal service of Chicago will be superseded by motor vehicles. The cars are to be owned and operated directly by the federal government, whereas the team and street car service which they will replace was under contract by private owners.

—

Speedwell Receiver Finishes Work

DAYTON, OHIO, Nov. 18—C. R. Green, receiver for the Speedwell Motor Car Co., in the action of the Dayton Savings & Trust Co. for foreclosure on mortgage bonds, has filed his final account and been discharged as receiver. His report shows $19,180.20 received and expended as receiver between Aug. 4 and Nov. 4, 1915.

Factory Miscellany

Howe Rubber Adds—The Howe Rubber Co., New Brunswick, N. J., maker of automobile tubes, will expend $70,000 for the construction of a new factory building in that city.

Equipment Co. to Build—The Champion Auto Equipment Co., Chicago, Ill., has purchased a plant at Wabash, Ind., where it will manufacture automobile tires, tire inflators and pumps.

To Make Parts in Boonton—The Central Machine & Supply Co., New York City, has acquired a site at Boonton, N. J., where it plans to establish a plant for the manufacture of automobile parts.

To Make Tires—A tire plant is planned for Wichita, Kan., by the Wichita Auto Tire Manufacturing Co. with a capital of $600,000. The incorporators are Charles Darrigrand, Ransom Stephens, C. H. Matson, W. T. Watson and M. V. Price.

National Rubber Adds—The National Rubber Co., Pottstown, Pa., is having a two-story reinforced concrete factory and a one-story power house built at Pottstown. The former is 135 by 170 ft. and the latter 45 by 120 ft.

To Make Spring Wheels—The Montana Improved Wheel Co., recently incorporated, contemplates the construction of a plant at Bozeman, Mont., for the manufacture of a spring wheel for automobiles.

Savage Tire Adds—The Savage Tire Co., San Diego, Cal., will build an addition to its plant on Main Street.

Oregon Co. to Build—The Oregon Motor Car Co., Portland, Ore., is preparing to build a plant 100 by 100 ft., costing $30,000.

Double-Tread Tire Plant in Salt Lake City—A. C. Friedman and Frank Sale, president and vice-president of the Western Double Tread Tire Co., 1241 Broadway, Denver, and Leo Jacobson, are organizing a Utah corporation to operate a double-tread tire plant in Salt Lake City.

To Make Steel Wheels—A new firm to be incorporated as the Ideal Wheel Co. will be established in Massillon, Ohio, for the manufacture of steel wheels for automobiles. Arnold Markel, Cincinnati, will be general manager. It will occupy a building at the plant of the Everhard company.

Limousine Top Buys Bldg.—The Limousine Top Co., Kalamazoo, Mich., has purchased a two-story building, 50 by 200 ft. which was part of the old Michigan Buggy Co. plant. A warehouse, 40 by 80 ft., has also been acquired. The company's business required these additions to meet the big increase in sales.

A. O. Smith Adds—The A. O. Smith Co., Milwaukee, Wis., pressed steel frames, parts and motor trucks, is about to erect a new boiler house to accommodate the increased demand of its power plant. The building will be 40 by 70 ft. in size and 50 ft. high, and contain three 300 hp. boilers, together with the latest conveying, stoking and pumping equipment. The company will spend $35,000 in the improvement.

Gemmer to Increase Production.—The Gemmer Mfg. Co. of Detroit, Mich., which makes steering gears, will greatly increase its production when additions to the plant, now under way, are completed. One addition consists of a two-story building, the size of which is partly 171 by 60 ft. and partly 138 by 60 ft. An alley, 20 by 350 ft., has been closed to give further room. These additions will enable all departments, principally the assembling, service and machine departments, to be relieved of their present pressure. According to officials, the business of the company is very good and orders now on hand will keep the plant running to full capacity for the next six months. The outlook is the brightest the company ever had.

The Automobile Calendar

Nov. 22-27.....Binghamton, N. Y., Show, State Armory, Binghamton Automobile Dealers' Assn.
Nov. 28.....Phoenix, Ariz., Grand Prix Race, State Fair Course.
Nov. 29-Dec. 4....Electric Prosperity Week.
Dec. 5.....Worcester, Mass., American Road Builders' Assn. Day.
Dec. 6-11.....Springfield, Mass., Show, Auditorium.
Dec. 7-10.....New York City, American Society of Mechanical Engineers Convention.
Dec. 31-Jan. 8....New York City, Sixteenth Annual National Automobile Show; Grand Central Palace; National Automobile Chamber of Commerce.

1916

Jan. 3-9.....Importers' Salon, Hotel Astor.
Jan. 5-6.....New York City, S. A. E. Winter Session. Standards Committee Meeting.
Jan. 7, 8, 10, 11...New York City, Convention National Assn. of Automobile Accessory Jobbers.
Jan. 7-13.....Milwaukee, Wis., Show, Auditorium.
Jan. 8-15.....Cleveland, Ohio, Show, Wigmore Coliseum, Cleveland Automobile Show Co.
Jan. 8-15.....Philadelphia, Pa., Show, Philadelphia Auto. Trade Assn.
Jan. 10-15.....New Bedford, Mass., Show, State Armory.
Jan. 15-22.....Detroit, Mich., Show, Detroit Automobile Dealers' Assn.
Jan. 17-22.....Rochester, N. Y., Show, Exposition Park, C. A. Simmons, Mgr.
Jan. 17-22.....Wilmington, Del., Show, Wilmington Automobile Show Assn.
Jan. 18-22.....Baltimore, Md., Show, Fifth Regiment Armory.
Jan. 18-22.....Lancaster, Pa., Show, Conestoga Park Pavilion.
Jan. 22-29.....Montreal, Que., Show, Almy's Bldg., Automobile Trade Assn., Ltd.
Jan. 22-29.....Chicago, Ill., Show, National Automobile Chamber of Commerce; Coliseum and First Regiment Armory.
Jan. 23-30.....Portland, Ore., Show, Portland Automobile Dealers' Trade Assn.
Jan. 24-29.....Buffalo, N. Y., Show, Buffalo Automobile Dealers' Assn., Broadway Auditorium.
Jan. 29-Feb. 5....Columbus, Ohio, Show, Memorial Hall, Columbus Automobile Show Co.
Jan. 29-Feb. 5....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Trade Assn.
Feb. 7-12.....Kansas City, Mo., Show, Convention Hall, Kansas City Motor Dealers' Assn.
Feb. 9-12.....Peoria, Ill., Show, Coliseum. Peoria Automobile and Accessory Assn.
Feb. 14-19.....Des Moines, Ia., Show, Des Moines Auto. Dealers' Assn.
Feb. 19.....Newark, N. J., Show.
Feb. 20-27.....Grand Rapids, Mich., Show, Klingman Furniture Exhibition Bldg., Automobile Business Assn.
Feb. 21-26.....Louisville, Ky., Show, First Regiment Armory.
Feb. 21-26.....Omaha, Neb., Show, Omaha Automobile Show Assn.
Feb. 21-26.....Syracuse, N. Y., Show, Syracuse Automobile Dealers.
Feb. 29-Mar. 4....Ft. Dodge, Ia., Show, Terminal Bldg., Ft. Dodge Automobile Dealers' Assn.
March 4-11.....Boston, Mass., Car and Truck Show, Mechanics Bldg.
Mar. 28-Apr. 3....Manchester, N. H., Show, Under Auspices Couture Bros. Academy.
May 13.....New York City, Sheepshead Bay Speedway Race.
May 30.....Indianapolis Track Race.
June 17.....Chicago Track Race.
June 28.....Des Moines, Ia., Track Race.
July 4.....Minneapolis Track Race.
July 4.....Sioux City Track Race.
July 15.....Omaha, Neb., Track Race.
Aug. 5.....Tacoma Track Race.
Aug. 18-19.....Elgin Road Race.
Sept. 4.....Des Moines Track Meet.
Sept. 15.....Indianapolis Track Race.
Sept. 16.....Providence Track Race.
Sept. 30.....New York City Sheepshead Bay Race.
Oct. 7.....Omaha Track Race.
Oct. 14.....Chicago Track Race.

The Week in the Industry

Battle Creek Hupp Moves—W. E. Teeter, Battle Creek, Mich., Hupmobile agent, has removed from 27½ West Jackson Street to 14 West Jackson Street.

Philadelphia Body Co. Adds.—Contracts have been awarded for the erection of two warehouse buildings 55 by 270 ft. and 64 by 90 ft., respectively, at Nineteenth Street and Glenwood Avenue, Philadelphia, for the Hale & Kilburn Manufacturing Co., makers of automobile bodies.

Philadelphia Metz Makes Lease—The Metz Automobile Co., 338-340 North Broad Street, Philadelphia, has leased property at 3437 North Broad Street, which has been converted into a showroom and service station, for the accommodation of the new Metz commercial car.

Recent Changes in Seattle—The McQuay-Norris Manufacturing Co., St. Louis, maker of Leak-Proof piston rings and Lynite pistons, has established a factory office in Seattle to look after the firm's interests in the Pacific Northwest. E. G. Norris, brother of President W. K. Norris of the St. Louis factory, is in charge of the office there.

The Willard Storage Battery Co., Cleveland, Ohio, has opened a branch office in Seattle in the Joshua Green Building, in charge of J. P. Schiller, Jr.

Recent St. Louis Changes—The Megue Rubber Co., St. Louis, has been appointed distributer of Mohawk tires in eastern Missouri and southern Illinois. Twenty-four subdealers have been established in St. Louis and ten in surrounding towns.

The Johnson Automobile Co., 3667 Olive Street, has been appointed distributer of H. & D. shock absorbers in Missouri and southern Illinois. Clermont Rider, formerly distributer in the St. Louis territory of H. & D. shock absorbers, has been appointed sales manager of the company and hereafter will be stationed at Goodland, Ind.

The Vehicle Top & Supply Co. has been appointed distributer in Missouri and southern Illinois of the Murphy disappearing truck body. The body is especially adapted to Ford roadsters and takes the place of the tool box.

A. H. Sullivan & Co., St. Louis, has been appointed distributer of the Forma-Truck in the St. Louis district. This is an extension attached to the chassis of Ford cars lengthening the wheel base to 125 in. and increasing the capacity to 1 ton.

Motor Men in New Roles

Wert Marion Supervisor—G. E. Wert has been made supervising distributer of Marion cars in practically one-half the State of Ohio and southern Michigan.

Nickolous Changes—H. J. Nickolous, formerly with the Studebaker Corp., has been made secretary of the Newell Motor Car Co., Hayes distributer in eastern Missouri and southern Illinois.

Jeffery Hupp Manager—C. E. Jeffery, Jr., formerly of the Wheelock-Jeffery Co., agent for the Oldsmobile at Boston, Mass., has been appointed manager of the Hupmobile Co., New England.

Reed Hollier Rep.—G. G. Reed, until recently New England distributor for the Detroiter, has become New England traveling representative for the Hollier Motor Sales Co., covering Maine, New Hampshire and Vermont.

Cramer Joins Carr—V. C. Cramer has been appointed manager of the Detroit branch of the F. S. Carr Co., Boston, which makes material for automobile tops. Mr. Cramer was formerly president of the American Distributing Co., Detroit.

Toebe Heads Hupmobile Station—The Harrington-Roebe Auto Repair Co., 717 North Grand Avenue, St. Louis, has been designated an official Hupmobile service station. The garage will be open day and night and will carry a complete line of Hupmobile parts. J. C. Toebe, formerly with the Weber Implement & Auto Co., is in charge.

Alfred Resigns—J. N. Alfred, who has been cashier of the Wilson Foundry & Machine Co., Pontiac, Mich., has resigned to become auditor of disbursements of the Timken-Detroit Axle Co., Detroit. Mr. Alfred was for over two years in charge of the credit and collection department of the Oakland Motor Car Co.

Dealers

Times Square Opens New Branch—The Times Square Auto Co., New York City and Chicago, has opened a branch at Kansas City, Mo.

Pittsburgh Packard Builds—A service station, three stories high, 100 by 224 ft., will be erected at Pittsburgh for the Packard Motor Co.

New York City Leases—The Hudson Motor Car Co., New York City, has purchased a site, 100 by 100½, on the north side of West Sixty-seventh Street, 125 ft. east of West End Avenue, and will erect a six-story automobile building to cost $150,000. The site cost $55,000.

The Nordyke & Marmon Co. has leased a site, 60 by 100, at 42-44 West Sixty-second Street, and will erect a five-story sales and service building. The present building was first occupied as a car establishment in 1903, by the White Co.

The Goodyear Tire & Rubber Co. has leased a store at 10 Central Park West, together with a basement space and offices on the second floor.

St. Louis Westcott Moves—The Westcott Motor Sales Co., St. Louis, has closed a lease for the garage of the former Cherokee Automobile Co., 3334 South Jefferson Avenue. This building with 8000 sq. ft. of space, will be used as a service station for Westcott owners and for general repair work.

Madison Dealer Builds—Rademacher & Jaeger, Milwaukee, Wis., Paterson distributers, are building a salesroom, 66 by 100 ft. and two stories, at 2805 and 2807 Vliet Street. The company has closed a contract with the Paterson Co. for 100 6-42 light sixes.

New Willard Service Stations—The Willard Storage Battery Co., Cleveland, has added the following service stations, making a total of 565: Keokuk Armature Works, 1001 Johnson Street, Keokuk, Iowa; A. P. Louch, 32 King Street, Brockville, Ont.; Bond Electric Co., Inc., 186 Main Street, Hornell, N. Y.; T. Carlson Electric Co., Brownwood, Tex.; Macan Jr. Co., 129 Ferry Street, Easton, Pa.; Fairbanks Electric Co., 58 North Main Street, Norwalk, Conn.; Beebe Electric Co., Bedford, Iowa; J. H. Spinharney, Cherokee, Iowa; Norfolk Tire Repair Co., Fourth and Braasch Streets, Norfolk, Neb.; Danville Storage Battery Co., 326 Craghead Street, Danville, Va.; Anaheim Ignition Depot, Anaheim, Cal., and Central California Electric Co., Elmwood Avenue, Lindsay, Cal.

Overland Building in Boston—The Overland Stores Co. is the name of the company that has taken title to a tract of land in the Back Bay section at Boston, Mass., upon which will be erected a four-story structure for the Connell & McKone Co., New England, distributor of Overland cars. The land has a frontage of 215 ft. on Brookline Avenue, and 495 ft. on an adjoining street. The Willys-Overland Co. is erecting another big place at Springfield and others will be put up elsewhere.